MARCH 1958

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CHEMICAL PROCESSING®

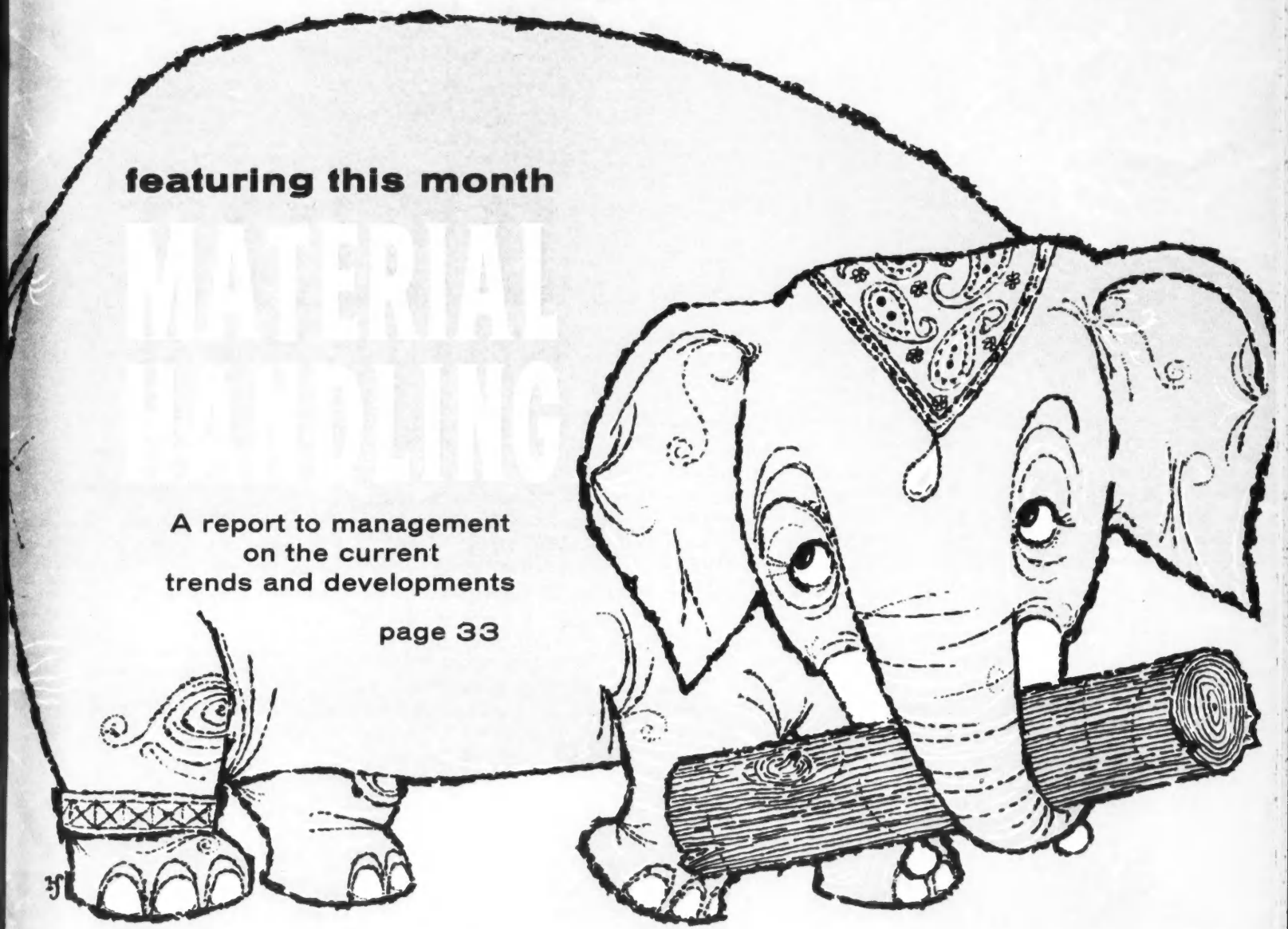
$1.00 the copy

featuring this month

MATERIAL HANDLING

A report to management on the current trends and developments

page 33



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HOW TO "SPEND" SULFURIC —AND HAVE IT, TOO!

Not everyone can do this. But when you can, the dollar savings mount up.

Many uses of sulfuric acid and oleum result in substantial quantities of relatively high-strength, impure acid which present problems of handling and disposal. This is particularly true if you use it as an alkylation catalyst, or for sulfonating white oils, synthetic detergents, etc.

But General Chemical may be able to show you how to "spend" your sulfuric acid and have it, too!

This depends on a number of factors. The acid strength . . . the nature and amounts of contaminants . . . the tonnage available . . . the distance of your location from our nearest plant—all have bearing. Generally, spent acids containing 70-80% sulfuric acid, or higher, can be reclaimed if they do not contain impurities harmful to the equipment.

General Chemical has many years of experience in solving spent acid problems of every kind. We will be happy to review the economics of converting *your* spent acid, and the assistance of our technical service staff is always available to help solve any handling and disposal problems you may have. Just call the nearest General Chemical office listed below.

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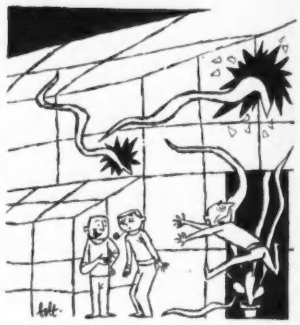
Check 3821 opposite last page

that's interesting

Life and death

A chemical well-known to each weekend gardener as a weed killer has dramatically increased latex production. This compound, 2-4-D, is deadly to broad-leaf weeds such as dandelions. Strange as



"That Jones . . . always trying a new plant growth stimulant"

it seems, less than an ounce of the same material, painted on a narrow section of the trunk of rubber trees has raised latex yields as much as 25 to 40%. It is mixed with palm oil which acts as a carrier and is absorbed into system of the tree. The chemical has also rejuvenated older trees, and added years to their productive life.

Food additives guide

A "Bromatopeia," an official compendium of chemicals accepted for use as food additives, has been proposed by Dr. Bernard L. Oser. Following precedent established by the U. S. Pharmacopeia, compendium of food additives could be established by joint cooperation of industrial, academic, and government representatives.

Freeze-thaw purification

"Fractional melting" process for purification of hard-to-purify substances has been developed by the National Bureau of Standards. Liquid sample is distilled into a fractional melting tube in a closed

inert system and cooled to just below freezing. Crystals formed reject impurities so bulk of contaminant is included in portion at top of sample. When crystallization is nearly complete, tube is inverted and heat applied. Fraction of liquid is periodically drawn off so final fraction is extremely pure.

Matched colors

A portable telescopic visual colorimeter is the name of a device developed by two scientists at Eastman Kodak Company to improve color matching of pictured scenes in color photography. Telescope is designed to ascertain color and luminosity of objects as close as a television screen, or several miles distant. Measurements can be taken of colors of an original scene under exact conditions in which color photographs will be made. Later, colors in various pictures taken can be compared with colors of original scene. The 47-lb instrument employs an additive color matching process, with red, green, and blue filters as standards.

True to life

A model that bleeds is helping to teach first aid in the US Navy. Life-size manikins present 10 realistic wounds which "bleed" when pressure is applied at specific points. The "blood" is a solution of

To page 5

". . . and this is our first-aid demonstration room"

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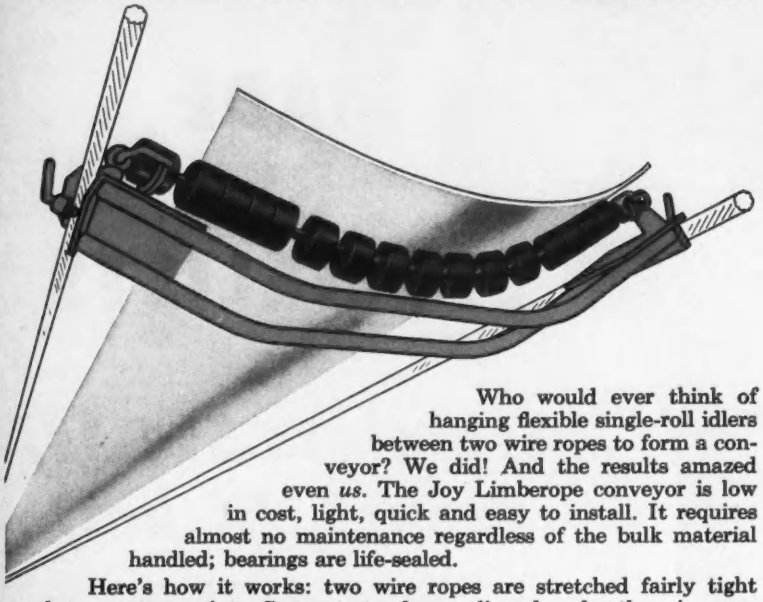
Check 3822 opposite last page

NEW IDEA in conveyor design

JOY LIMBEROPE ROPE BELT CONVEYOR



Who would ever think of hanging flexible single-roll idlers between two wire ropes to form a conveyor? We did! And the results amazed even *us*. The Joy Limberope conveyor is low in cost, light, quick and easy to install. It requires almost no maintenance regardless of the bulk material handled; bearings are life-sealed.

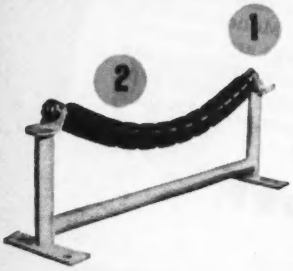
Here's how it works: two wire ropes are stretched fairly tight between two points. Support stands are slipped under the wire rope every 12 to 40 feet. Limberoller conveyor idlers are fastened by a simple lock screw at intervals determined by the material handled. Material flows better because of a unique flexing action . . . as the load comes on belt, the ropes "give," resulting in excellent troughing, less spillage even where big lumps are a problem.

That's all there is to it. Simple? You bet . . . and foolproof. Let us demonstrate how the Limberope rope belt conveyor will cut costs for you.

Write for Bulletin 217-80

NEW IDEA in conveyor belt idlers

JOY LIMBEROLLER



Write for Free Bulletin 217-80A

Radically different from all other idlers, the Limberoller is a single roll idler consisting of neoprene discs molded to a flexible steel cable. The entire idler turns on its own axis. (1) Only two bearings are used, one at either end, up out of the dirt. (2) The idler supports the belt across its entire width . . . eliminates gaps left by ordinary 3-roll idler. This even support, combined with cushioning "no-bump" action of neoprene discs, can increase belt life 6 times and more. The Limberoller can be installed on *any* belt conveyor, even on existing conveyors.

W&W L 6966-217

JOY *Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*

In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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CHEMICAL PROCESSING.

with which is combined
CHEMICAL PROCESSING PREVIEW
and Chemical Business

For the management team

Vol. 21 March 1958 No. 3

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This issue of CHEMICAL PROCESSING magazine distributed to more than 50,000 members of the Management Team, wherever chemicals and chemical processes are involved:

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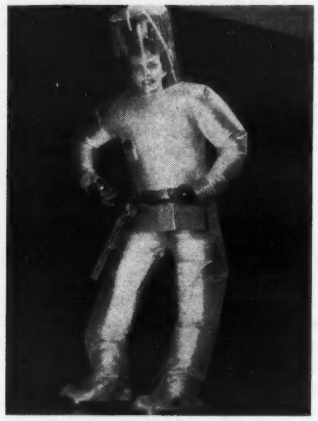
glycerine, water, and vegetable dyes. It is carried through rubber tubing along the normal course of principal arteries to wound site so that pressure points can be demonstrated. Table on which the manikin lies is designed with reservoirs into which solution drains and collects, and is then re-circulated.

Fashions, circa 1984?

No, not a girl from Mars. This inflated suit of vinyl film is a product of Goodyear Tire & Rubber Co.'s films and flooring division, and finds use currently among those who

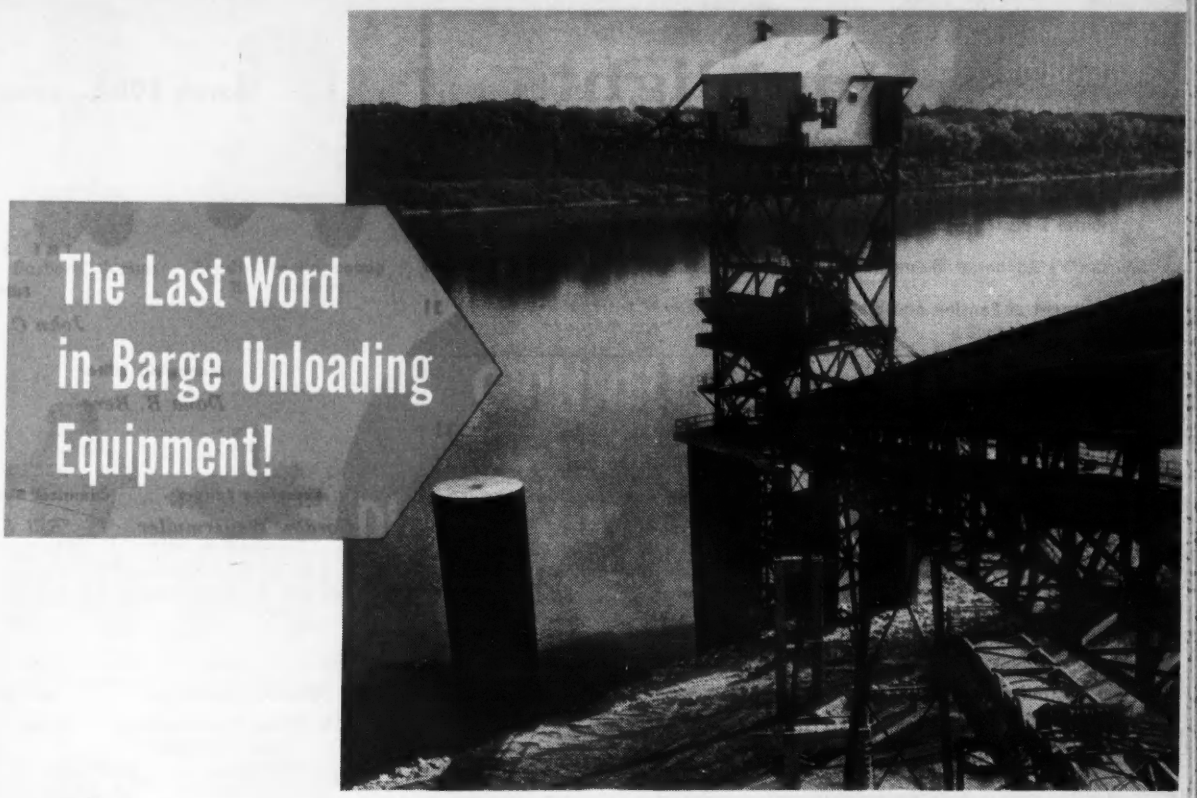


work with radioactive materials. While not particularly figure flattering, the suit protects our science-fictionish damsel from stray radioactives in the atmosphere. Although this fashion is extremely practical, we seriously doubt that it will become popular among couturieres.

Education aid

Training of young scientists in colleges and universities is helped by Servo Corp.'s Servo-lab[tm] unit. It is specially designed for laboratories to instruct students in design of self-correcting systems for automatic control of production lines and control systems for military use.

More "That's Interesting" items are on pages 63, 71, 213, 242-243.



The 6th H&P high-capacity rope trolley barge unloader located on the Ohio River is in its final stages of erection. Like the others, the complete job was done by Heyl & Patterson—*from design to erection.*

In the picture you can notice the "unusually high" lift (105 ft. average), the arrangement of the 2500 ft. bucket cable reels, permitting continuous reeving (i.e. easy replacement of worn rope and lower rope cost per ton of material handled), the 5 ton electric hoist and lift beam for ready installation of these cable reels, and the bucket buggy for convenient and fast changing of buckets.

The rope trolley motions are controlled by an adjustable voltage system; a guided counterweight is provided for economical operation of the 12-ton bucket, which is equipped with a counterweighted tagline to prevent twisting, and good visibility is provided in the operator's cab to easily observe bucket and barge haul operations. The barge haul will be mounted on a floating dock.

For further information on all types of bulk material handling equipment, contact your H & P Contracting Engineer.

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chemical processing

highlights

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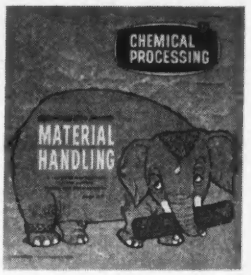
THIS MONTH'S COVER

Historically speaking, we don't know which came first in the annals of material handling — "Jumbo" or the wheel. However, Jumbo's size symbolically reflects the big job material handling equipment is doing in fighting today's continuously rising operating costs. Never has material handling played such an important role in the production of chemicals and allied products. Because of this, the subject is featured this month, starting page 33. "Jumbo" is the creation of CP staff artist Howard Solotroff.



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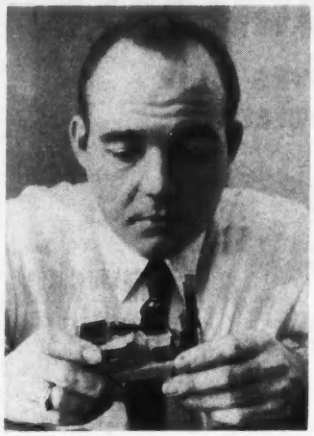

Who plays around with material handling?

"No one can overstress the importance of material handling as a means for combatting today's high operating costs . . . top management is well aware of the need for even more improvements (in material handling operations) in the competitive period ahead," says Francis M. Anable, Victor Chemical Works' vice president, in the article opening the feature on material handling (page 33).

His is just one of the many similar statements coming from the group of men participating in this feature. Everyone CP editors talked to in conjunction with the feature was enthusiastic about the project. Realizing the present need for more concentrated emphasis on cutting handling costs, they were more than willing to take part in the feature.

In addition to Mr. Anable's article discussing top management's approach to solving material handling problems, there are articles discussing the engineering, financing, purchasing, and other managing aspects of material handling operations in the chemical processing plant and the five major fields of material handling equipment.

Of course, in working up such a feature, we are in contact with many groups and individuals. We would particularly like to thank the Material Handling Institute and Mr. Roland Puder of the Du Pont Co. for their many valuable suggestions and ideas.

George V. Michaels

Assistant Editor

GRINNELL-SAUNDERS Diaphragm Valves are easily equipped for power operation — by combining any of numerous power operators, a sliding stem bonnet assembly, and a valve body. The sliding stem bonnet can be modified to accommodate any make of power operator, pneumatic or electric.

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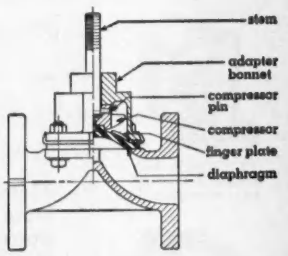

This sliding stem bonnet is specially designed for power operation. The power operator is attached to the adapter bonnet and to the threaded end of its free-sliding stem. Thus, the operating force is applied *directly*. The stem, in turn, is directly connected to the compressor which opens and closes the valve when power is applied. This sliding stem bonnet is interchangeable with other bonnet designs.

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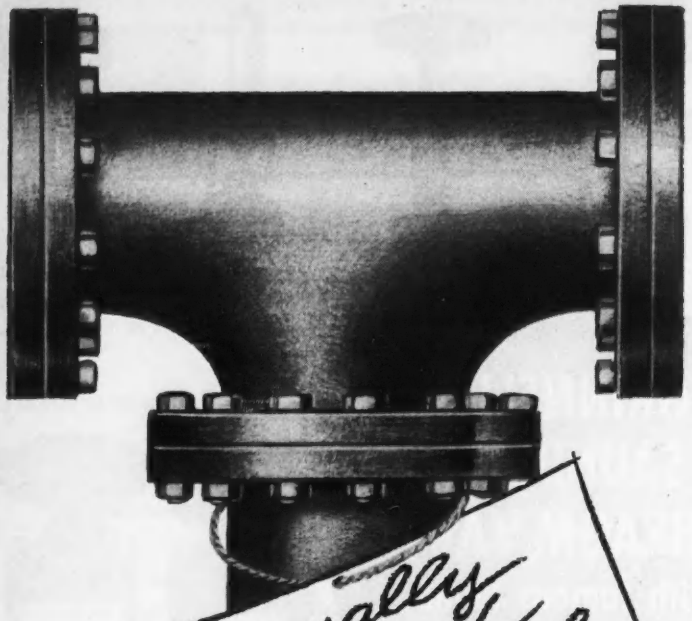

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conventions and exhibits

Meetings and shows of interest to the chemical processing industries

March 6. Synthetic Organic Chemical Manufacturers Association, luncheon meeting, Hotel Roosevelt, New York.

March 14. Sabine Area Section of the American Institute of Chemical Engineers and the Texas-Louisiana Gulf Section of the American Chemical Society, Fifth Annual Joint Technical Meeting, Lamar State College of Technology, Beaumont, Texas.

March 17-21. International Atomic Exposition, Inc., International Amphitheatre, Chicago.

March 17-21. National Association of Corrosion Engineers, Annual Conference and Exposition, Civic Auditorium, San Francisco.

March 26-28. American Power Conference, 20th Anniversary Meeting, sponsored by Illinois Institute of Technology, Hotel Sherman, Chicago.

March 26-28. Society of Plastics Industry, Inc., Pacific Coast Section, Annual Conference Meeting, El Mirador Hotel, Palm Springs, California.

March 27. Commercial Chemical Development Association, Rubber Meeting, Statler Hotel, New York.

April 1-3. The American Society of Mechanical Engineers, Conference of ASME Division of Instruments & Regulators, University of Delaware, Newark, Delaware.

April 13-17. Third Pacific Chemical Exposition, sponsored by The California Section, American Chemical Society, Civic Center Exhibit Hall, San Francisco.

April 13-18. American Chemical Society, 133rd National

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Check 3827 opposite last page

Meeting, Civic Center Exhibit Hall, San Francisco.

April 14-17. American Society of Mechanical Engineers, Design Engineering Conference, International Amphitheatre, Chicago.

April 15-17. American Welding Society, Annual Welding Show, Kiel Auditorium, St. Louis.

April 20-23. American Institute of Chemical Engineers, Sheraton-Mt. Royal Hotel, Montreal, Canada.

April 21-23. American Oil Chemists' Society, Spring Meeting, Peabody Hotel, Memphis.

April 27-*May* 1. The Electrochemical Society, Inc., Statler Hotel, New York.

May 1-8. American Society of Tool Engineers, 26th Annual Meeting and Tool Show, Convention Center, Philadelphia.

May 8-10. Western Material Handling Show, Great Western Exhibit Center, Los Angeles.

May 11-14. Fluid Controls Institute, Lake Placid Club, Lake Placid, New York.

May 11-15. American Society of Mechanical Engineers, Oil and Gas Power Con. and Exhibit, Bellevue-Stratford Hotel, Philadelphia.

May 19-23. National Fire Protection Association, Annual Meeting, Palmer House, Chicago.

May 26-30. American Management Association, National Packaging Exposition, Coliseum, New York.

June 1-6. Ninth Annual Industrial Research Conference, Columbia University, New York.

June 9-12. National Materials Handling Exposition, Public Auditorium, Cleveland.

September 9-12. Tenth National Chemical Exposition, International Amphitheatre, Chicago.

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WRITE for description and specifications. Lapp Insulator Co., Inc., Process Equipment Division, 330 Chestnut St., Le Roy, New York.

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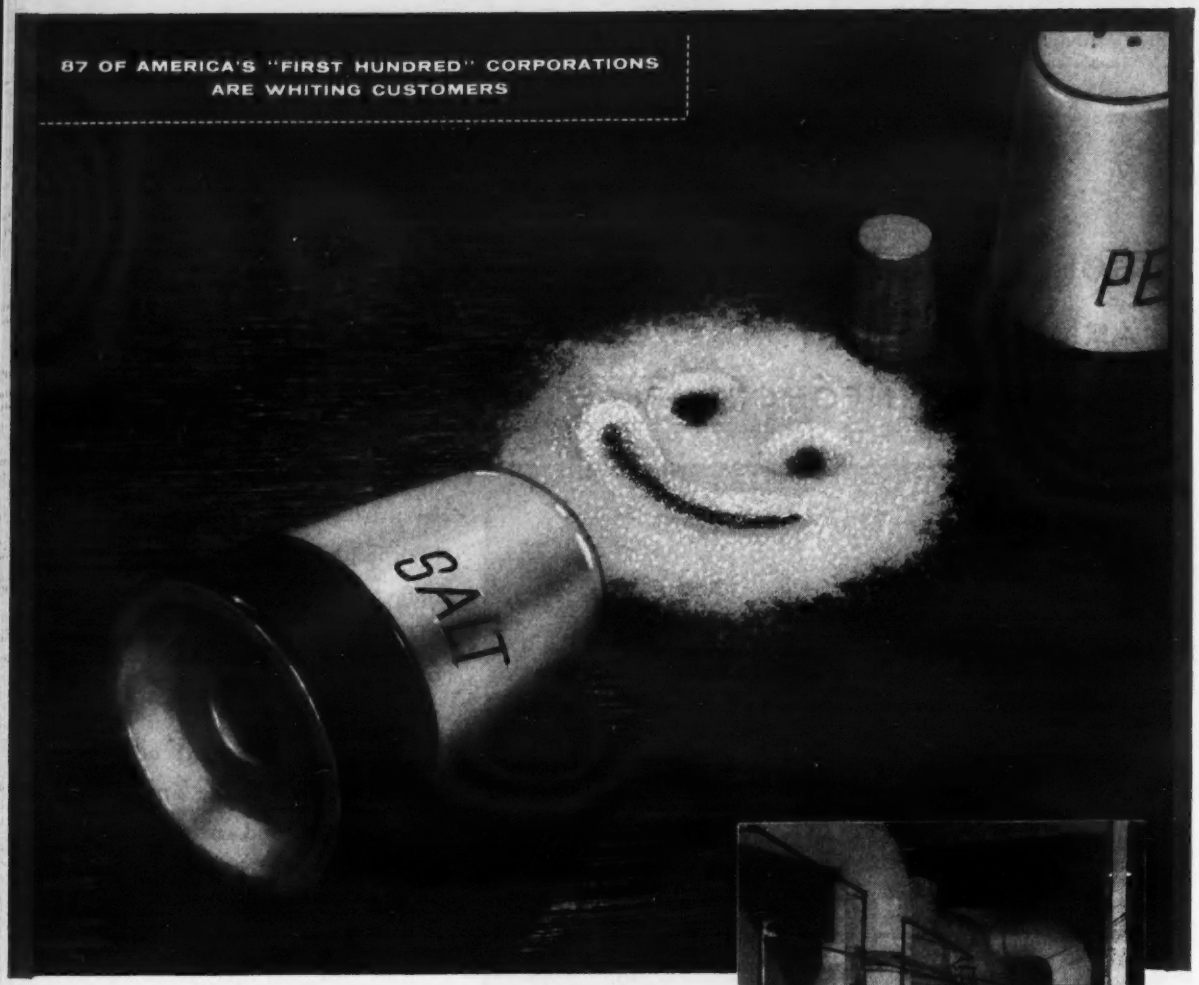
87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS



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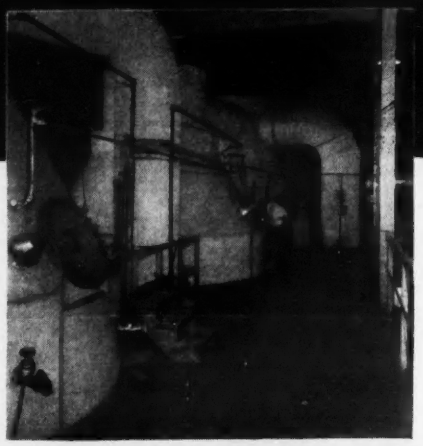
Food, chemical, pharmaceutical . . . whatever your processing need, there's a custom-designed, custom-engineered Swenson Evaporator that will help improve your product quality.



This quadruple-effect, forced circulation evaporator is a part of the quality team at one of the leading salt companies.

Send For Booklet!

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SWENSON

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Check 3829 opposite last page

looking ahead to next month

Quick previews of some highlights in April Chemical Processing

Tower packing performance

Tellerettes are polyethylene rosettes that provide a 20-40 percent greater cooling efficiency when used as cooling tower packing. One of the first users of them was the US Army, in one of its mobile cooling towers.

Assistant Editor Bill Clarke visited the Badger Manufacturing Company, builders of the tower for the Army, and gathered details on how the packing actually performs. Story is in the Idea section of CHEMICAL PROCESSING for April.

Low-pressure process for polyethylene

One of the most important chemical process developments in recent years has been the low-pressure process for polyethylene. And of the three processes available to US producers, the most popular has been that developed by Phillips Petroleum.

In next month's petrochemicals section, Petrochemical Editor Gordon Weyermuller takes you inside the Celanese Phillips-process plant at Pasadena, Texas. With the cooperation of Plant Manager B. E. Cash and Production Superintendent S. T. Ross, he's gathered process information, flow charts, photos — a complete picture of how high-density polyethylene is actually produced.

Insect resistance — We can make it or break it!

Insect resistance seems to be a relative thing. The degree to which an insect species is resistant depends upon what definitions we set for

To page 12

CP FEATURE

Material Handling and its role in the chemical processing industries is featured in this month's CHEMICAL PROCESSING.

This issue marks the first time that CP has featured this important phase of chemical production.

Many aspects will be covered

The feature covers such related aspects of material handling as management, engineering, purchasing, financing, trends, and new developments.

These aspects are discussed by top men in both the chemical processing and material handling fields.

Of course, there are several case history stories telling how other companies have been able to realize savings with improved handling methods.

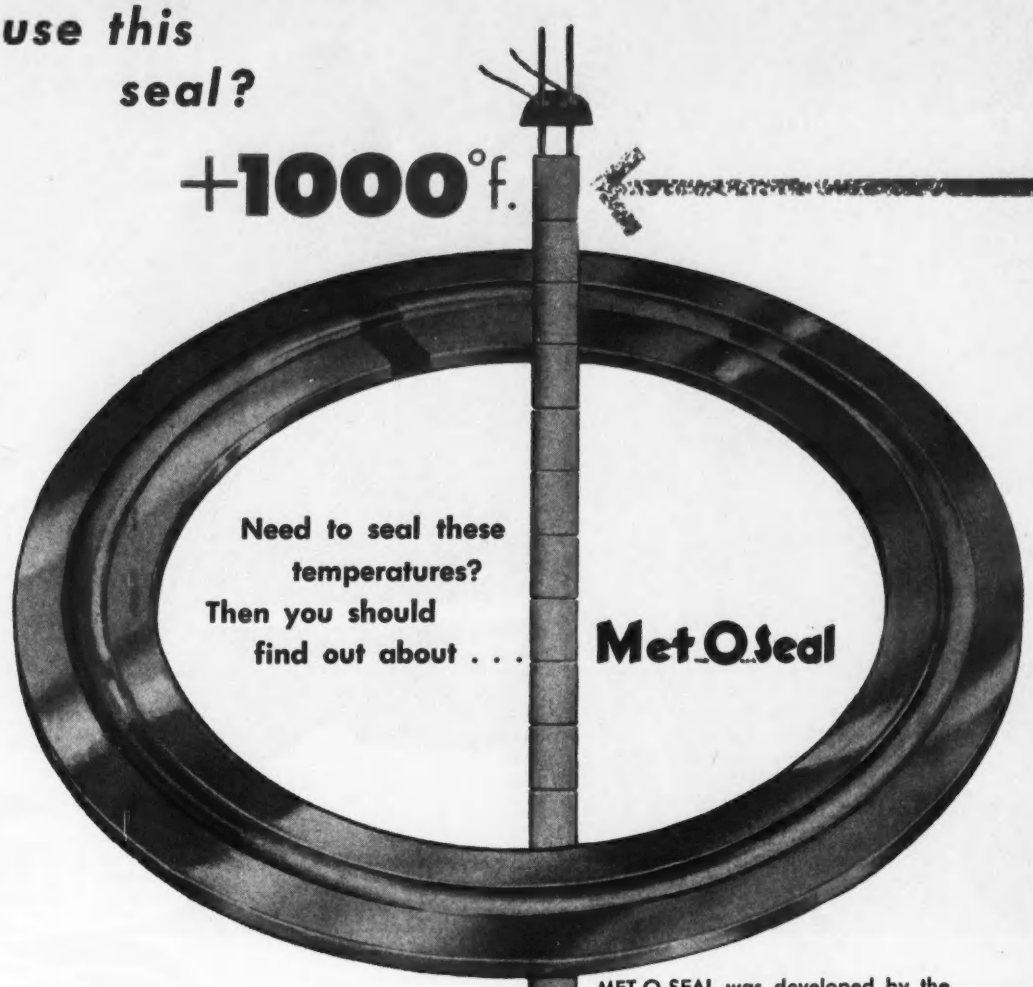
Since material handling ties in with practically all operations in the chemical processing plant, there is something of interest for everything.

So be sure

. . . to look for the material handling feature in this issue. It starts on page 33.

can you use this seal?

+1000°f.



MET-O-SEAL was developed by the Franklin C. Wolfe Company to provide a practical answer to *no-leakage* sealing at extreme temperatures. Here are just some of the advantages obtainable:

- Lower machining costs
- Less flange weight
- Can not blow out
- No loss of structural strength
- No leakage!

If you design in these temperature ranges why not find out about MET-O-SEAL, one of the proven members of the Gask-O-Seal Family?
New literature NOW available upon request. Write For Free Copy.

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FRANKLIN C. WOLFE CO.
Culver City, California
"sealing design specialist"
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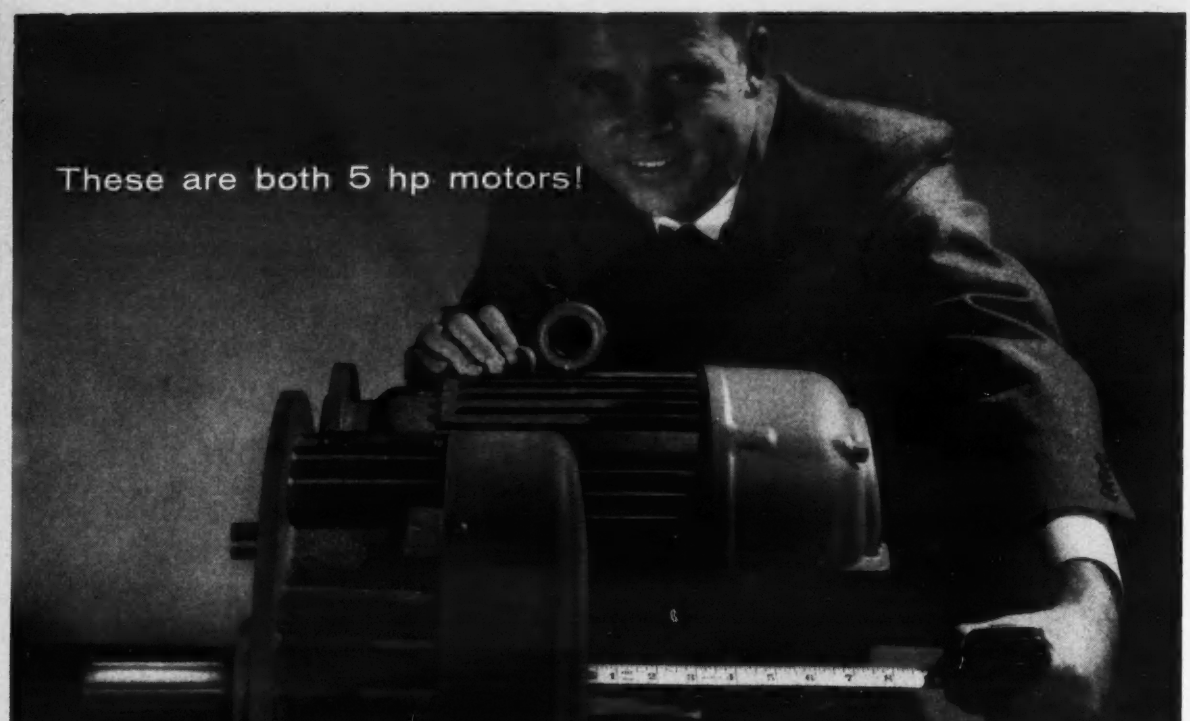
creative leader in fluid systems

Check 3830 opposite last page



60% shorter— but with radial air-gap design!

New Louis Allis Pancake Motor preserves all the advantages of conventional motor construction

The new Louis Allis Pancake Motor is your solution to trouble-free power in any space-cramped motor application.

The Pancake is a remarkably short flange-mounted motor — up to 60% shorter and 33% lighter than standard motors of the same rating! And it is built in *conventional* radial air-gap design!

It's done by an ingenious forming process which literally compresses the end coils of a conventional radial air-gap motor into an exceptionally short length. The result is a compact, light motor ideally suited for horizontal or vertical mounting on machine tools, roof ventilating fans, or *any* close-quarter installation where space is a critical design factor.

What's more, this is achieved without sacrificing a single desirable characteristic: the stator still contains the same iron and copper as standard Louis Allis motors . . . standard NEMA service factor is maintained . . . high insulative values are retained by using proved Louis Allis varnishes and new insulating techniques . . . over-sized pre-lubricated bearings are used to guarantee long bearing life . . . and the entire motor is enclosed in an industrial-type cast-iron housing designed to shrug off abuse!

The housing and flange are cast in one piece: this permits extra-accurate internal machining which extends bearing life and reduces noise levels to a new low.

Investigate the Pancake Motor through your local Louis Allis District Office. Sized from 1 to 15 hp, at 1800, 1200, and 900 rpm, in open drip-proof and enclosed non-ventilated or fan-cooled enclosures. Write for Bulletins 2100 and 2150 to the Louis Allis Co., 448 E. Stewart St., Milwaukee 1, Wis.

SM-101

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Check 3831 opposite last page

Next Month

From page 10

resistance and on the test methods that are used to determine it.

Take the cotton boll weevil for example. In certain southern states, many of the mature weevils that were sampled recently were not killed when insecticide was placed in actual contact with the insect. Does this mean weevils have become resistant?

To Hercules Powder Company, manufacturers of toxaphene, an important boll weevil insecticide, this was a challenge.

Its technical service department entomologists and chemists, working sprayer-in-hand with cotton growers in these areas, found these very same species were *not* resistant if the pattern of insecticide application was changed — moved to earlier in the season. Close scheduling of applications permitted helpful insects to thrive, only killed harmful ones.

Full details on this story of a technical service department in action will be told in next month's CHEMICAL PROCESSING magazine.

Question: How about Russian chemicals?

In Russia, as in the United States, the tremendous growth of the chemical industry has been of basic import to the national industrial growth. Yet the Soviet chemical industry remains something of an enigma to its American counterpart. How is its day-to-day business carried on? How are the products distributed? How far have the Russians come in various fields? How about the quality of Russian chemicals?

Next month, Chemical Business Editor Bill Schremp interviews Standard Oil's Dr. John Tolpin, one of our foremost observers of Russian chemicals. You'll get a new insight into the problems as well as the strong points of the important and rapidly expanding chemical industry in Russia.

letters from readers

The war on bugs

Dear Sir:

I was interested to read Dr. Hoffmann's article on "How Can We Beat Resistant Insects?" (Nov. CHEMICAL PROCESSING, page 42).

The challenge of developing new and more effective insecticides to augment the materials to which insects are developing resistance is one which no one in the chemical industry can afford to ignore.

The universities and colleges have traditionally borne the prime responsibility for basic research, including research on the mode of action of insecticides and mechanisms of insect resistance. We in the industry support this type of research, both indirectly and directly through gifts and grants in aid. We believe that this basic research will provide the scientific data and information required for effective long-range solutions.

The science of synthesizing and testing new chemicals as insecticides has traditionally been the prime responsibility of the chemical manufacturer. Since the appearance of the insect resistance problem, our efforts have been redoubled in this direction and we are now developing new and better insecticides at a higher rate than ever before. Through applied research, we firmly believe we can keep one step ahead of insects while basic research supplies the information leading to a more thorough understanding of the problems and their solutions.

HANS STAUFFER
President

Stauffer Chemical Co.

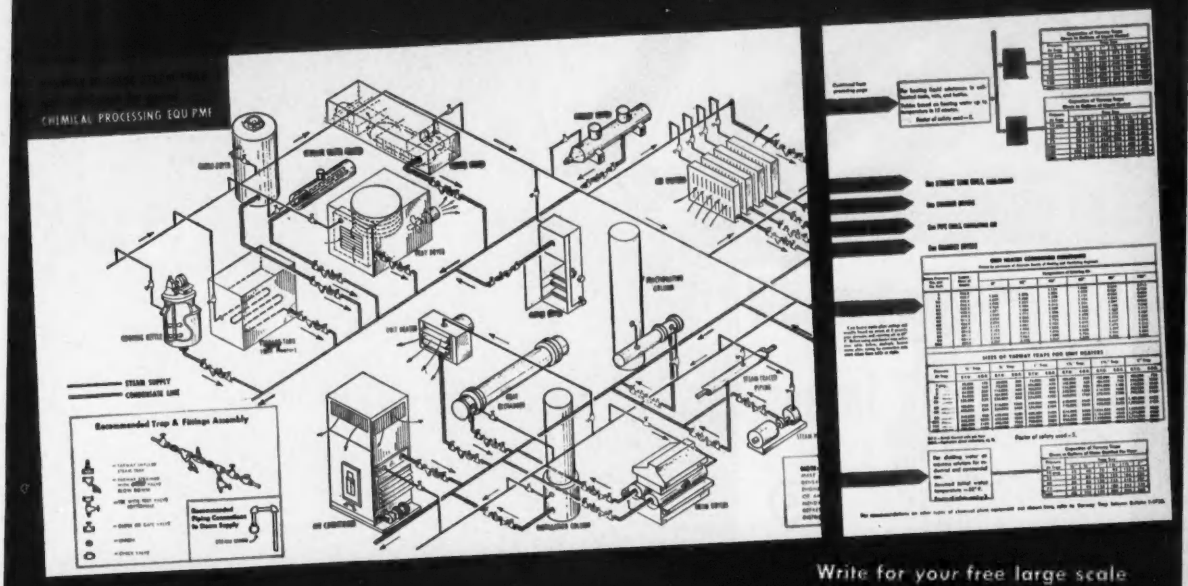
Return enemy assets

DEAR SIR:

I refer to the article published in the October issue of CHEMICAL PROCESSING (page 36) under the byline of my distinguished friend, the very able Senator from Florida, George Smathers.

Senator Smathers advocates the use of seized German

HOW TO TRAP CHEMICAL PROCESSING EQUIPMENT—*PROFITABLY*



Write for your free large scale Chemical Piping Diagram and Steam Trap Selector.

"This Yarway Piping Diagram and Steam Trap Selector is a real big help to us."

When it comes to picking the right steam trap for the right job, this YARWAY bulletin is invaluable.

Piping diagrams for trapping 22 typical kinds of process equipment are shown—and selector tables covering 35 types of equipment.

The selector will guide you in *choosing* the correct steam trap, and the piping diagrams will show you the proper *installation*.

On all your steam trap requirements, the way to be sure of successful *performance* is to use YARWAY IMPULSE STEAM TRAPS—the impulse that revolutionized steam trapping 20 years ago and has sold over a million traps since.

Write for your FREE copy of this YARWAY Piping Diagram and Selector for Chemical Processing Equipment, or get one from the local YARWAY Industrial Distributor—over 270 cover the country.

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Yarway Impulse Steam Trap. Gets equipment hot in a hurry and keeps it hot! Stainless Steel. Good for all pressures. Only one moving part.

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IMPULSE® STEAM TRAP

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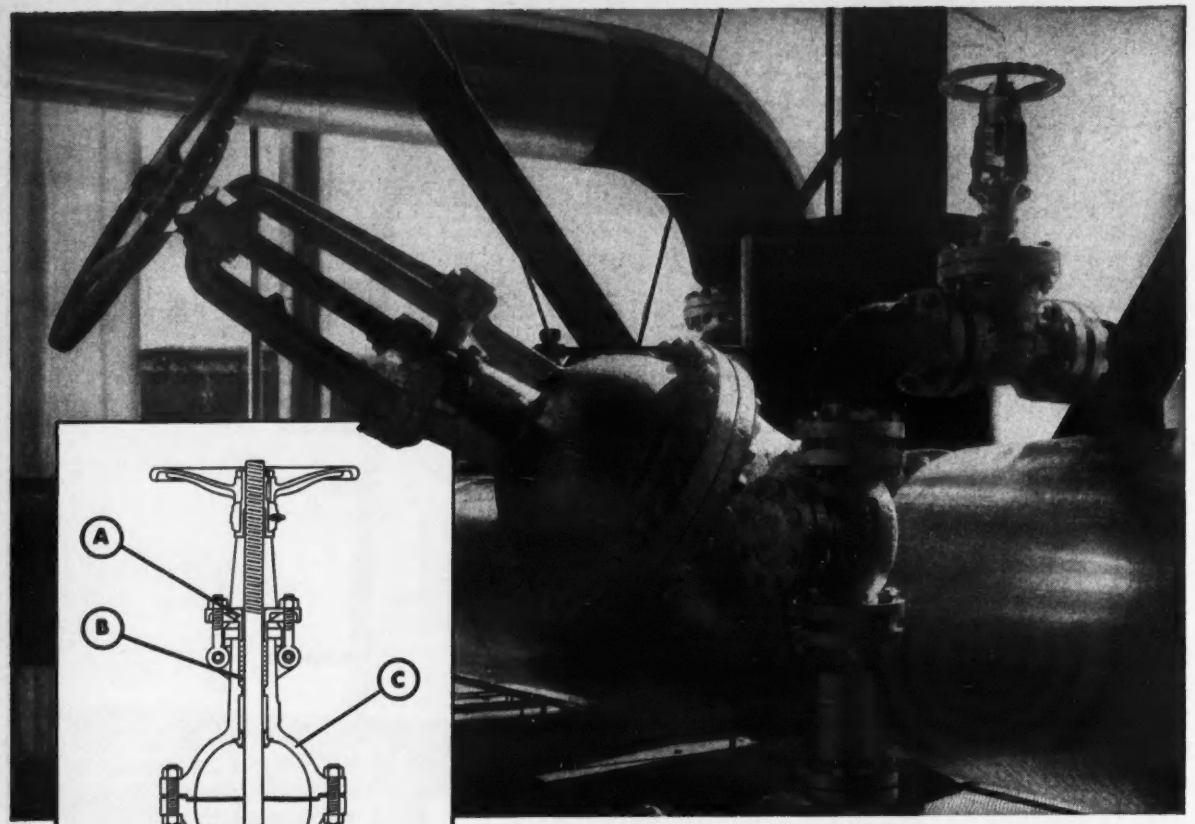

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CAST STEEL GATE VALVES OFFER YOU THESE FEATURES
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(A) GLANDS: Clearances between the gland and stuffing box, and gland and stem, are such that the stem cannot be scored even if the gland is pulled down unevenly.

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(F) STREAMLINED PORTS: Permit unobstructed flow which results in minimum pressure drop and reduces the possibility of erosion.

Walworth Cast Steel Gate Valves can be furnished with either flanged ends or butt welding ends. Roller bearing yokes are available on the larger sizes. On valves 4 inches and larger, by-passes can be furnished. Walworth Cast Steel Gate, Globe and Check Valves from Series 150 to 2500, are available. For Series 600 and higher, we recommend Walworth Pressure Seal Cast Steel Valves. See your Walworth Distributor or write to Walworth for complete information.

WALWORTH

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Check 3833 opposite last page

assets to finance scientific education of our youth as a bulwark against Russian inroads. It seems to be utter and irresponsible folly to trade the certainty of a German bulwark against Communist aggression, the likelihood of saving the lives of American soldiers and the good will of a newly found member of the community of free nations, namely that of West Germany, against dollars and cents.

I cannot believe that the Senator or those who support the views he propounds will, upon due reflection, continue to plead that we measure the blood our American boys gave on foreign battlefields, to save the honor of our nation, against dollars and cents we happen to have in our possession.

I am unequivocally in favor of returning these seized assets. I hold to this view as a patriotic citizen and soldier. I support the Treaty of Friendship our administration has concluded with the new Germany because, from my own personal and business observations in Germany, I know that Germany recognizes with humility the crimes committed by the Hitler horror and attempts earnestly to make amends. And I hold to this view also because, as a student of history, I realize that for the sake of America's future generations, we must give moral support to the young democratic spirit in Germany which is struggling to shake off the shackles of the Nazi holocaust.

America recognizes that her future depends on sound scientific development — but not at the price of sacrificing our national integrity. May I add that I am chagrined to see a publication of as high a scientific standing as CHEMICAL PROCESSING exploited as a sounding board for a special interest group.

JULIUS KLEIN
Chicago

While the views of Senator Smathers do not necessarily coincide with those of the editors, it has been, and will continue to be, our policy to

air all sides of questions important to the industry and to the Nation.

The columns of CHEMICAL PROCESSING will always be open to honest and knowledgeable debate on all such subjects. —Ed

On Manpower Shortages

GENTLEMEN:

I have read with distress your recent articles concerning the apparent shortage of scientific personnel. Mr. Schremp clearly states, the question of whether a shortage exists or not is largely rhetorical.

It is without question from all my personal contacts, namely fellow workers, *no shortage* exists. This can be exemplified by the number of chemists, chemical engineers and other scientific personnel unemployed. This can be further shown by the reduction of help wanted ads for scientific people.

I have been employed as process engineer for eight years and the only other time it has been worse as far as unemployment is concerned was 1950. The only point I make is — *no shortage of scientific personnel exists at the present time.*

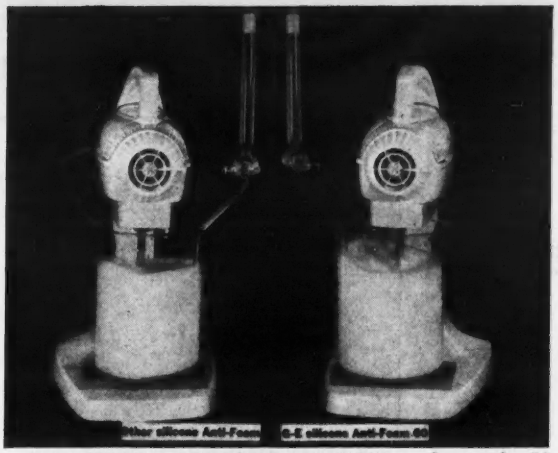
LEONARD MAISEL
General Electric Company

Dear Sir:

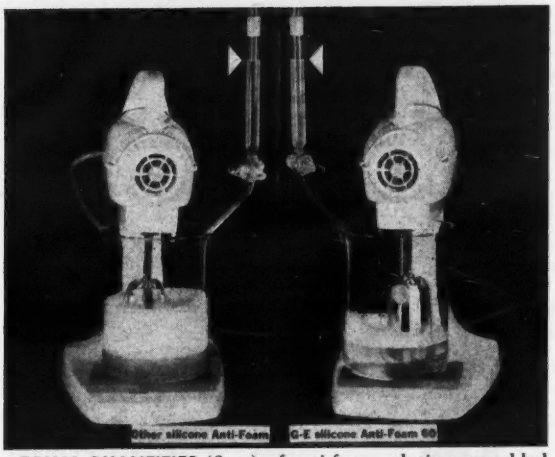
One of the obvious approaches to "Solving the Manpower Shortage" (*page* 25, Dec. CP) has been completely overlooked by your article — and, so far as I can tell, by all the armchair experts in this field.

Does it occur to author Schremp that there are at least thousands of technical people selling insurance, working in offices, or (as Mr. Schremp himself) writing for a living? Why should this be? I suspect earning power has something to do with it. If a real technical manpower pinch ever develops to the "we'll pay more" stage, it will solve itself.

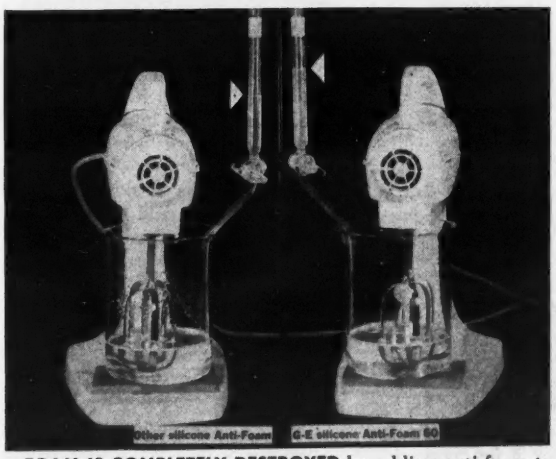
RALPH M. WADLER
Chicago, Ill.



TWO IDENTICAL DETERGENT SOLUTIONS are beaten for 10 minutes at the same speed. Left burette contains dilute solution (0.1% silicone solids) of other leading silicone anti-foam. Right burette contains similar solution (0.1% silicone solids) of G-E Anti-Foam 60.



EQUAL QUANTITIES (3 cc) of anti-foam solution are added to each beaker, sufficient to kill initial foam in both beakers. When beating is resumed for 5 minutes, heavy foam again forms in beaker containing anti-foam "X" (left), but not in beaker with G-E AF-60.



FOAM IS COMPLETELY DESTROYED by adding anti-foam to each beaker until it is impossible to restore any foam by continued beating. This takes 5.8 cc of anti-foam "X", only 3.9 cc of G-E AF-60.

30% Less Silicone Anti-Foam Needed When You Specify General Electric AF-60

The test at left, of course, only proves the superior economy of General Electric AF-60 in one foaming system. But it is typical of the success being reported for AF-60 in many aqueous systems.

The best test for you is to try G-E AF-60 in your own operations. You'll find it disperses faster than any other silicone anti-foam, yet G-E AF-60 comes to you in a higher concentration to reduce inventory and storage costs. We'll be glad to send you a free sample if you mail the coupon below. General Electric silicone fluids and compounds are also available for efficient low-cost defoaming of non-aqueous solutions.

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SILICONE PRODUCTS DEPARTMENT,
WATERFORD, NEW YORK

MAIL THIS COUPON FOR A FREE SAMPLE . . .

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☐ aqueous system ☐ non-aqueous system

Application_____

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When you need fabricated vessels and process equipment, Chicago Steel Tank Company, with its facilities, know-how, and experience, can meet your most rigid requirements and code specifications. Call a C.S.T. sales engineer today.
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recent books

reviews of current technical and reference work . . . summarized for you by authorities in the field with the CP Staff

Coal Science

Reviewed by
REYNOLD Q. SHOTTS
Professor of Mining Engineering
University of Alabama

In "Coal Science Aspects of Coal Constitution", by D. W. Van Krevelen and J. Schuyer, the authors set out to marshall the evidence for a reasonable picture of coal constitution, and they have succeeded most admirably. They have drawn liberally from their own highly significant work, frankly stating in the preface that although they have attempted to give a fair evaluation of the work of others, the 352-page book is "subjective in the sense that the authors have placed special emphasis on the contribution known as satistical constitution analysis made by their own laboratory."

In Part I, coal is considered briefly as a naturally occurring fuel, an organic sediment, a rock, as plant debris, and as a structured physical system. In Part II, statistical constitution analysis is applied to both physical and chemical examination of coal, and a structural picture is discussed. The third part reviews physical and chemical properties, and seeks to explain them by the structural picture of Part II.

The reviewer notes: 1) less stress is put on biological and other environmental conditions to which plant matter was subjected prior to burial, than in most of the published literature on coal constitution coalification; 2) a few selected analyses are used rather than mean values or other statistical measures from many analyses — probably it was necessary that samples represent pure petrographic types, but one often wonders if broad conclusions should be drawn from narrow bases; 3) references to American work are few. That this situation represents a bias is most doubtful. One wonders if it reflects a dearth of truly fundamental work on coal constitution from American sources.

To obtain "Coal Science", remit $9.50 *direct to D. Van Nostrand Co., Inc.,* 250 *Fourth Ave., New York* 10, *N. Y.*

Check 3836 opposite last page.

Dangerous Properties of Industrial Materials

Over 8500 industrial chemicals, metals, solvents, and other materials are described from a "safety point of view" in this volume.

This new book, edited by N. Irving Sax, supercedes his popular "Handbook of Dangerous Materials". New book (a hefty 1470+ pages) has now "graduated" from the handbook category.

The book is divided into twelve sections, which are thumb-tabbed for quick reference. These are: toxicology, ventilation control, personal protection and hygiene, atmospheric pollution, radiation hazards, industrial fire protection, storage and handling of hazardous materials, reactor safeguards, allergic disease in industry, information on 8500+ chemicals (with 1060 pages, this is by far the largest section in the book), shipping directions, and an index to synonyms for the names of the materials.

The book looks as though it was "typeset" on a Veritype, and printed by the off-

set process, instead of the usual letterpress. It looks similar in appearance to the publisher's recent "Condensed Chemical Dictionary," and should make a good companion volume to it.

To obtain "Dangerous Properties of Industrial Materials" remit $22.50 direct to Reinhold Publishing Corp., 430 Park Ave., New York 22, New York.

Industrial Chemicals

One hundred and forty important industrial chemicals (ranging from acetaldehyde to zinc oxide) are individually described in this 844-page volume prepared by W. L. Faith, D. B. Keyes, and R. L. Clark.

For each chemical, the authors tell how it is made and used, production and prices from 1935 or 1936 through 1956, important properties, economic aspects, and manufacturers and their plant sites.

This volume should make a fine desk reference.

To obtain "Industrial Chemicals, 2nd Ed.," remit $16.00 direct to John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y.

Check 3837 opposite last page.

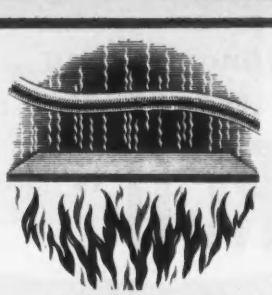
Organic Reactions

VOL. IX
Reviewed by
DANA S. DAVIS
Tuscaloosa, Alabama

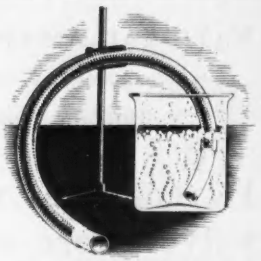
This is the most recent addition to a unique series of texts discussing the scope and usefulness of a number of important syntheses. These books were published primarily to simplify for researchers the work usually encountered in gathering data for modifying the applications of general methods for special needs. Consequently, editor-in-chief Rodger Adams and his associates have carefully endeavored to see that the material should appear from a

To page 19

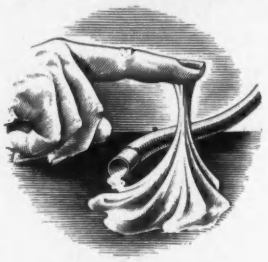
If your HOSE LINES must cope with these conditions...



HIGH TEMPERATURES



CORROSIVE CHEMICALS



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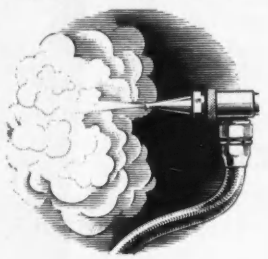
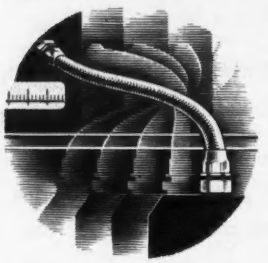
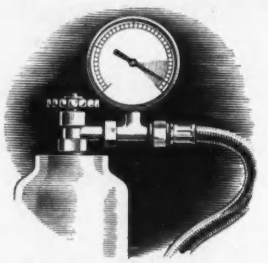


LIVE STEAM



FLEXING AND IMPULSING



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Discover how hose lined with TFE-fluorocarbon resin can cut your maintenance and downtime losses. See your hose supplier or write to: E. I. du Pont de Nemours & Co. (Inc.), Room 2420, Nemours Building, Wilmington 98, Delaware.

In Canada: Du Pont Company of Canada (1956) Limited, P.O. Box 660, Montreal

TEFLON is Du Pont's registered trademark for its fluorocarbon resins, including the TFE (tetrafluoroethylene) resins discussed here.

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BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

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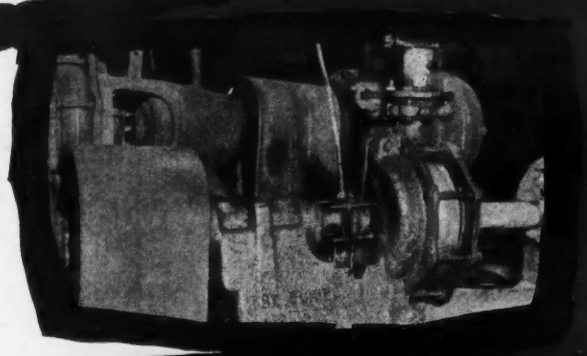
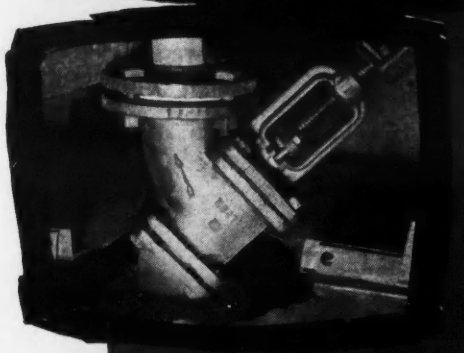
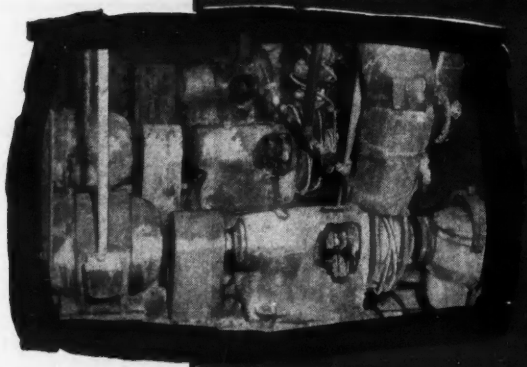
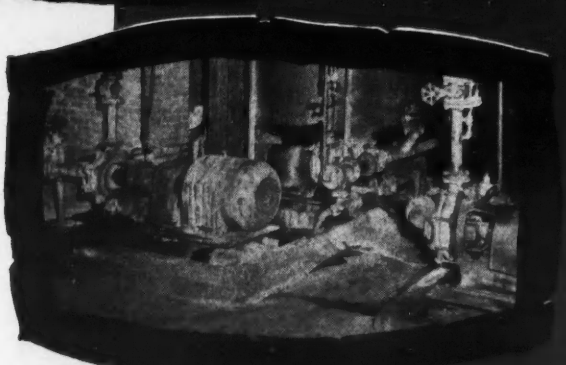
DURCO is the choice at









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PETROCHEMICALS SECTION

—starts on page 135 in this month's CHEMICAL PROCESSING and is carrying news on the booming worldwide petrochemical industry.

Designed for Management

Section has been especially designed to meet the needs of petrochemical management.

It analyzes the meaning of petrochemical developments here and abroad. Engineering-type articles telling how costs can be cut, labor saved, or products improved are included.

Information on petrochemical processes are featured.

Reports study on petrochemicals

This month, the section leads off with continuation of study CHEMICAL PROCESSING made in cooperation with a number of petrochemical leaders.

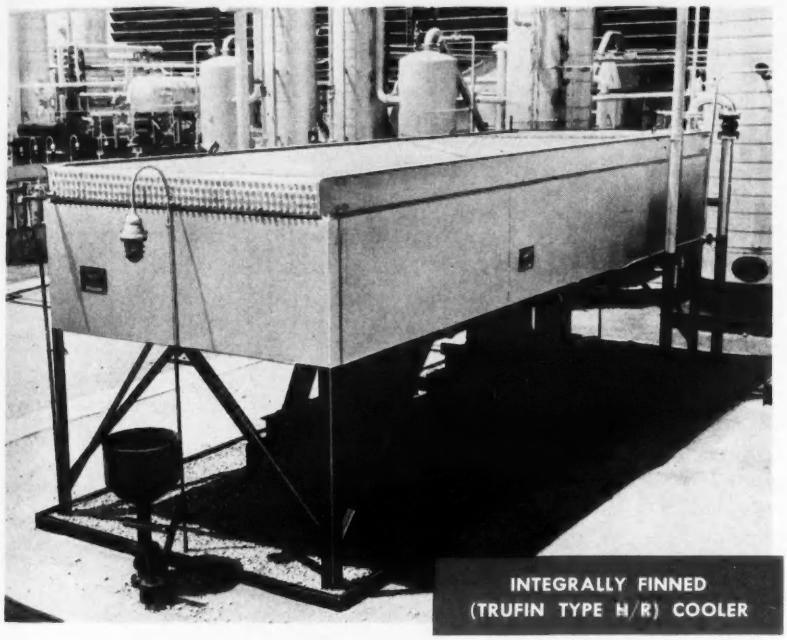
Report indicates petrochemical industry will top growth rate for either petroleum refining or chemical industry.

For more information on product at left, specify 3839 see information request blank opposite last page.

WOLVERINE
TUBE
Items of Interest to the Processing Industry

PUBLISHED BY WOLVERINE TUBE

AIR COOLER TUBED WITH WOLVERINE TRUFIN® TYPE H/R



INTEGRALLY FINNED (TRUFIN TYPE H/R) COOLER

BY ERNEST DODD

Of major interest to the processing industry—particularly in those areas where water is scarce or costly—is the operating record of an air cooled Monoethanolamine heat exchanger currently on stream in a West Texas gas plant.

The unit is tubed with Wolverine Trufin Type H/R high-finned aluminum condenser tube and was fabricated by the **Happy Company** of Tulsa, Oklahoma.

Since going on stream in May, 1954, it has operated continuously, effectively and economically in handling a heat load of 4,000,000 btu's per hour in cooling 200 gpm of 8% MEA solution from 160° F. to 120° F. with 100° air at 3000 feet elevation. Coil design pressure is 150 psig at 250° F. The coil is 6-pass and has four rows of 1″ O.D. x 24′ long aluminum high-finned tubes.

Wolverine Trufin Type H/R is ideally suited for air-cooled operations and proved, in this case, to be the most economical tube in both capital investment and maintenance. Type H/R's ratio of outside to inside surface area is approximately 8:1. It is available in a wide range of sizes in both copper and aluminum.

Because its integral fins are squeezed directly from the tube wall, they have a life expectancy equal to that of the tube —they can never shake loose because of vibration, thermal shock or pressure variations.

Listed on page 4 of this insert are the names, addresses and telephone numbers of Wolverine's highly skilled Technical Sales Representatives. If you want more information about Wolverine Trufin — or if you have a problem concerning the use of finned tube in heat transfer applications just call the one nearest you. There is no obligation.

Wolverine Pioneered Integrally Finned Tube

In recent years, increased heat transfer effectiveness through the use of extended surface tubing has become a well established principle and accomplishment.

A large share of the credit for this is due to Wolverine Tube because of its pioneering in the field of integrally finned condenser tube.

In manufacturing this type of tubing, Wolverine extrudes the fins spirally from the tube wall. This extrusion process produces a smooth fin minus sharp angles or crevices. The fins are actually part of the tube wall and are unaffected by excessive vibration or other hazards.

Wolverine Trufin is available in a wide range of sizes and alloys in copper, aluminum and electric-welded steel. Its various types are S/T (for shell and tube condensers), H/A, H/R, and L/C (for air cooled use primarily) and Type I/L (a high finned exterior tube with longitudinal interior fins).

TRUFIN CATALOG AVAILABLE—FREE

Wolverine's Trufin Catalog carries complete descriptions of each type of Trufin condenser tube. In addition to sizes, metals and alloys the catalog also describes the various applications where integral finned tube can be used to full advantage. This book is a valuable source of finned tube information —should be in the reference file of every processing engineer. Write today for your free copy—there is no obligation.

interchangeable with plain condenser tube (Type S/T only)
easily fabricated— available in U-bends
one-piece construction
several types of end treatments available
high finned outside to inside surface ratios up to 8-1. (Types H/R, L/C, and I/L)
available with either high or low fins with a wide variety of fin spacings

smooth extruded fins eliminate sharp angles and crevices

fins stand up under thermal shock, vibration and pressure changes

available in copper, copper-base alloys, aluminum and electric-welded steel

more BTU's per foot of tube

THIS IS WOLVERINE TRUFIN!

Look at the advantages—see for yourself what Trufin can do for you. Specify it for new installations and for retubing at turn-around time. You'll do a bigger job . . . boost production . . . save money, too!

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ON STREAM TIME UPPED WITH TRUFIN ON JOB

Designers — when working for the first time with integrally finned condenser tube—sometimes assume that finned tubing should be used only in a clean service.

Nothing could be farther from the truth. The compilation of actual operating data and the results of extensive pilot plant research are proving, instead, that integrally finned Wolverine Trufin actually gives better service than plain tube over longer periods of time.

Comparison tests have shown that when Trufin fouls, the build-up of the scale follows the profile of the fins and tube instead of preferring the valleys between the fins. Thus because Trufin does not present a flat, unbroken surface there is a strong tendency for the scale to fall away which prevents the build-up of an impervious layer.

TRUFIN HELPS CUT STRUCTURAL WEIGHT

Design of smaller heat exchangers and condensers is now possible because of Wolverine Trufin. This integrally finned condenser tube transfers more BTU's per foot of tube — thus permitting more heat transfer surface to be packed into a given area.

Where overhead units are used, the compact, powerful Trufin units require less structural support—an important feature which contributes substantially to lower costs.

Write for FREE Book

Actual installations where Wolverine Trufin is being used throughout the processing industries are described in "Wolverine Trufin Process Flowsheet Book".

In addition, this handy book contains information about Wolverine Tube, its facilities and the specialized services it offers its customers.

Processing engineers—both experienced veterans and those just starting their careers—will want to add the Trufin Process Flowsheets Book to their reference files. Write for your copy today.

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Wolverine Trufin is available in Canada through the Unifin Tube Company, London, Ontario

From page 17

"preparative viewpoint" and that adequate coverage of the involved mechanisms, related processes, and experimental conditions and procedures be attained.

The authoritatively written topics of Volume IX include discussions of cleavage of non-enolizable ketones with sodium amide, Gattermann synthesis of aldehydes, Baeyer-Villiger oxidation of aldehydes and ketones, alkylation of esters and nitriles, reaction of halogens with silver salts of carboxylic acids, synthesis of B-lactams, and Pschorr synthesis and related diazonium ring closure reactions. Book extends over 468 pages, contains 55 tables and a countless number of projectional formulas, is thoroughly indexed, and is documented with 1821 references.

To obtain "Organic Reactions, Vol IX," remit $12 direct to John Wiley and Sons, 440 Fourth Ave., New York 16, New York.

Check 3840 opposite last page.

Modern Pulp and Paper Making

Reviewed by
DANA S. DAVIS
Tuscaloosa, Alabama

In preparing this third edition of George S. Witham's "Modern Pulp and Paper Making," John B. Calkin has achieved an informative and useful source of technical data. Those who are new to the industry will find the language of the book to be especially easy to follow. Where terminology specific to the manufacture of pulp and paper appears, satisfactory definitions are always given.

After a brief history of the industry, the book deals with the processes of papermaking: measurement, hauling, stor-

Emery NEWS

WEIGHING SYSTEM

BIN, TANK AND HOPPER EDITION No. 8

Covering design, development and application data on Emery Weighing Systems for industrial applications.

AMAZINGLY SIMPLE EMERY WEIGHING SYSTEMS SPEED CONTROL OF CONTENTS IN MULTI-TANK OPERATIONS

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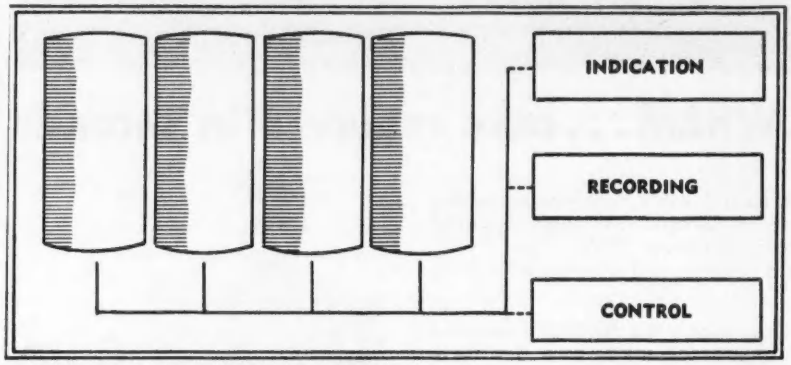
The key to the renowned accuracy, repeatability and maintenance-free operation of the Emery Weighing Systems is the unbelievable simplicity of the sturdy Emery Hydraulic Load Cell. Built with the precision characteristic of all top-quality instruments, the Emery Cell incorporates the ruggedness which makes it ideally suitable for rough industrial usage.

In effect, the Emery Cell is a transducer which converts load into proportional pressures which, in turn, are used to operate suitable instrumentation. The Emery Load Cell nullifies the use of complicated electrical circuits and electronic devices. Any man in your shop can understand and operate an Emery Weighing System.



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Is simple weight indication adequate? Do you need recording? Could you use printed records? Do you want automatic control? All of them are readily available to you either at the tanks or at a remote station.

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When you buy a tank-weighing system, buy the readily understandable, easy-to-operate, maintenance-free, Emery Weighing System. Don't burden your processing operations with complex, hard-to-handle, electronic circuits and devices. **Stay simple . . . buy Emery!**

In multi-tank operations, the Emery Weighing System is particularly applicable. Because of the simplicity of its design, it is usually less expensive than the more complicated weighing systems. Yet, in use, it provides uncanny accuracy and repeatability and all tanks can be weighed and controlled from one control station.

Whether you want simple indication, recording, combination indication and recording, simple or complex control, or a variety of printed forms, investigate the possibility of using the usually less expensive and easily the most simple tank weighing system available today.

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One instrument manufacturer whose products team up effectively with the simple design of the Emery Load Cell is The Foxboro Company.

Shown here is the well-known Foxboro Circular Chart Recorder with an Indicator Dial. This instrument is eminently suitable for multi-tank installations.

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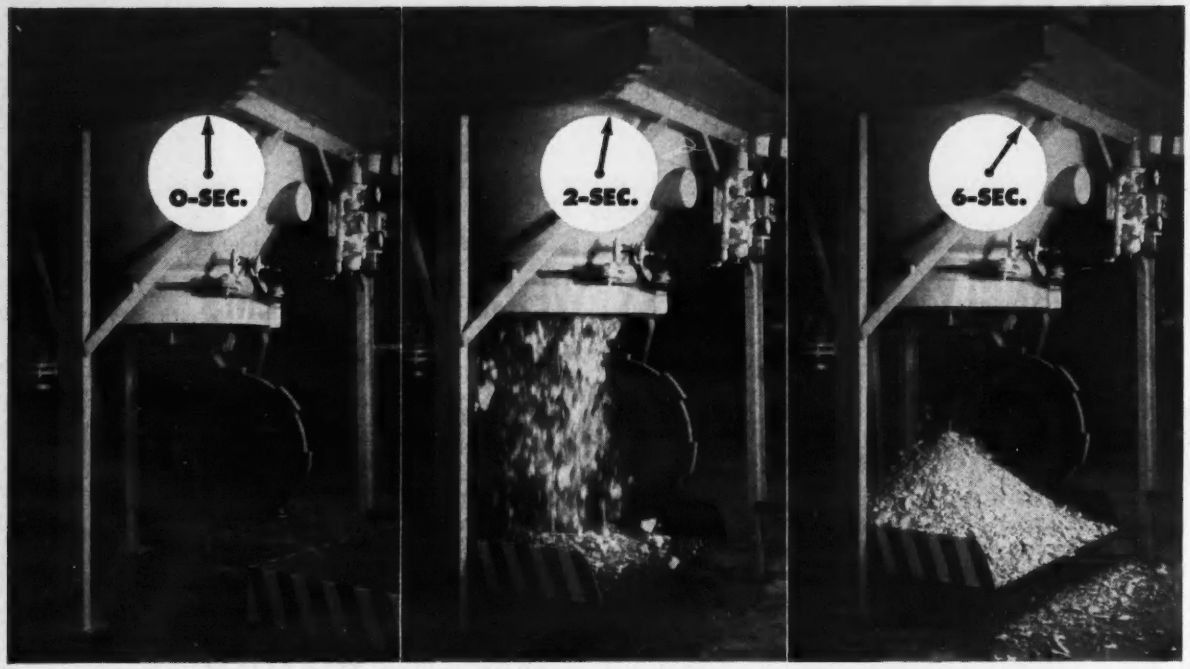

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Industrial's quick opening bottom drop door is the **fastest available method for removing large volumes of solids in a dry form or slurry,** depending on the customer's wishes. When necessary... the cake can be leached before removal from the filter to recover valuable salts, sugars or other constituents.

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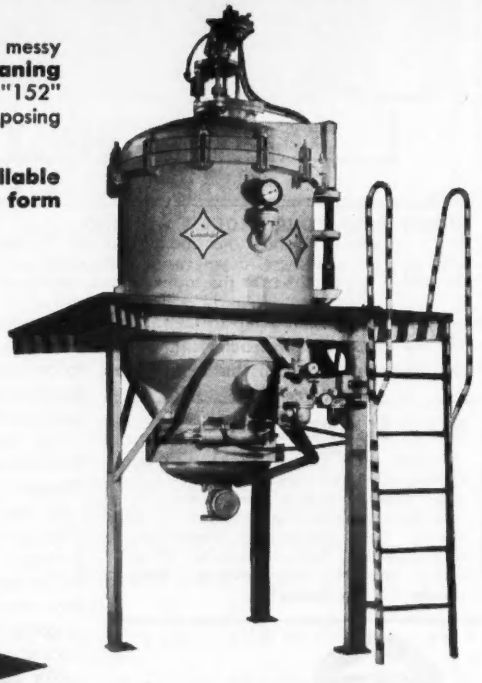

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age, barking, and chipping of pulpwood; bleaching and refining of pulp; formation and finishing of paper; and testing of pulp and paper. This 549-page treatise, which contains 16 tables and 165 figures, also includes valuable sections on general mill design, economics, and process instrumentation.

Most of the photographs of equipment and mill scenes in this third edition are new. The lengthened chapter on testing methods and equipment is an improvement on the single-page descriptions of a few physical tests that appeared in the earlier editions, although the space accorded to freeness testing is somewhat meager.

Footnoting, lists of references, and subject index are adequate.

To obtain "Modern Pulp and Paper Making," remit $10 *direct to Reinhold Publishing Corporation,* 430 *Park Avenue, New York* 22, *N. Y.*

Quantitative Organic Analysis

Reviewed by
DR. D. A. SHIRLEY
University of Tennessee

This 303-page book by J. S. Fritz and G. S. Hammond is primarily designed as a text for a course in quantitative organic analysis. Its major emphasis is on principles used in solving new problems in that field. Particular attention is given to the problem of analyzing mixtures of compounds containing the same functional group, by taking advantage of differences in the rates of reactions. This approach to problems of analysis is treated in some detail, and constitutes a strong feature of book.

Little space is devoted to description of actual laboratory procedures. A final section of fourteen chapters describes laboratory details for some analyses selected because of their usefulness in

illustrating principles.

Characteristic of the modern approach to subject are sections on spectrophotometric methods, polarographic methods, metal-ion complexes, acid-base titrations in non-aqueous solvents, chromotographic methods, and isotopic dilution methods. While detailed treatment of these areas is not provided, basic theoretical principles are examined with sufficient care. Thought-provoking problems are provided at end of each chapter.

To obtain "Quantitative Organic Analysis," remit $6.50 *direct to John Wiley and Sons, 440 Fourth Avenue, New York 16, New York.*

Check 3844 opposite last page.

Encyclopedia of Chemical Technology

First Supplement

Even though the 15th vol of this massive work was published only a year ago, its been about nine years since the first volume appeared. At that time, such subjects as "Automation" and "Computers" were in their infancy. To bring the Encyclopedia up-to-date, this First Supplement Volume has been prepared.

The authors have tried to avoid merely making minor additions on many subjects. They have instead covered about fifty subjects which have undergone fundamental changes in character in recent years. These subjects include adhesives, algal cultures, antibiotics, boron hydrides, detergents, emulsion paints, industrial enzymes, epoxy resins, fluidization, irradiation, nuclear reactors, plastics, silicones, solar energy, solid state physics, steroids, urethanes, and water demineralization.

Detailed bibliographies and subject index are included.

To obtain "First Supplement Volume of Encyclopedia of Chemical Technology" remit $25.00 *direct to Interscience Publishers, Inc.,* 250 *Fifth Ave., New York* 1, *N.Y.*

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nuclear notes

Significant news about atomic energy

Initial test passed by portable reactor

Self-sustaining nuclear reaction has been achieved in reactor core of the Martin Package Power Reactor. Being built under contract with AEC, reactor will be part of self-contained nuclear power plant. The packaged plants, about 9x9x30′ in size, will weigh from 6 to 15 tons each, and will be capable of being transported anywhere in the world by currently operating cargo aircraft.

Thermonuclear info exchange setup

Both the United States and England continue to make advances in the thermonuclear field. To speed progress, the countries have a close, cooperative arrangement for exchange information on research in the field. Both positive and negative findings are promptly communicated between the two nations.

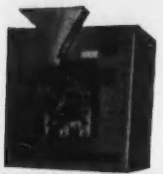
EBWR's power level more than doubled

The Experimental Boiling Water Reactor (EBWR) at Argonne National Laboratory has been successfully operated at 50,000 kw of heat— more than double its design capacity. The increase in power was achieved without change in number of arrangement of fuel elements within reactor core. Maximum stable power for the unit is believed to be still higher.

Yankee power plant given go-ahead

The AEC has issued a permit to Yankee Atomic Electric Company for construction of a pressurized water-power reactor near Rowe, Mass. Plant is scheduled to produce 134,000 kw of electricity.

MAGNETIC SEPARATION



Model T-20 Magnetic Separator. A small machine for a quick evaluation.

Model T-25 Magnetic Separator. The ultimate laboratory equipment for results directly comparable with commercial models.

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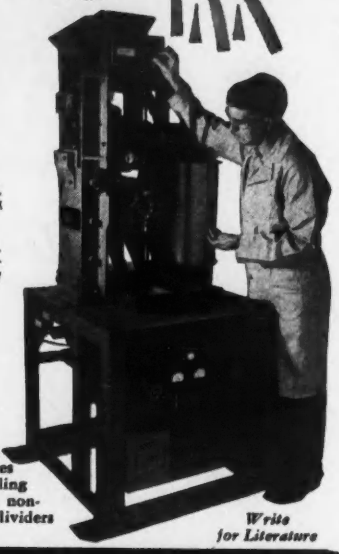
Exolon High Intensity Magnetic Separators flow material onto a magnetized rotor. Particles influenced by magnetism, cling to the rotor longer than nonmagnetic particles. Knife dividers complete the separations.



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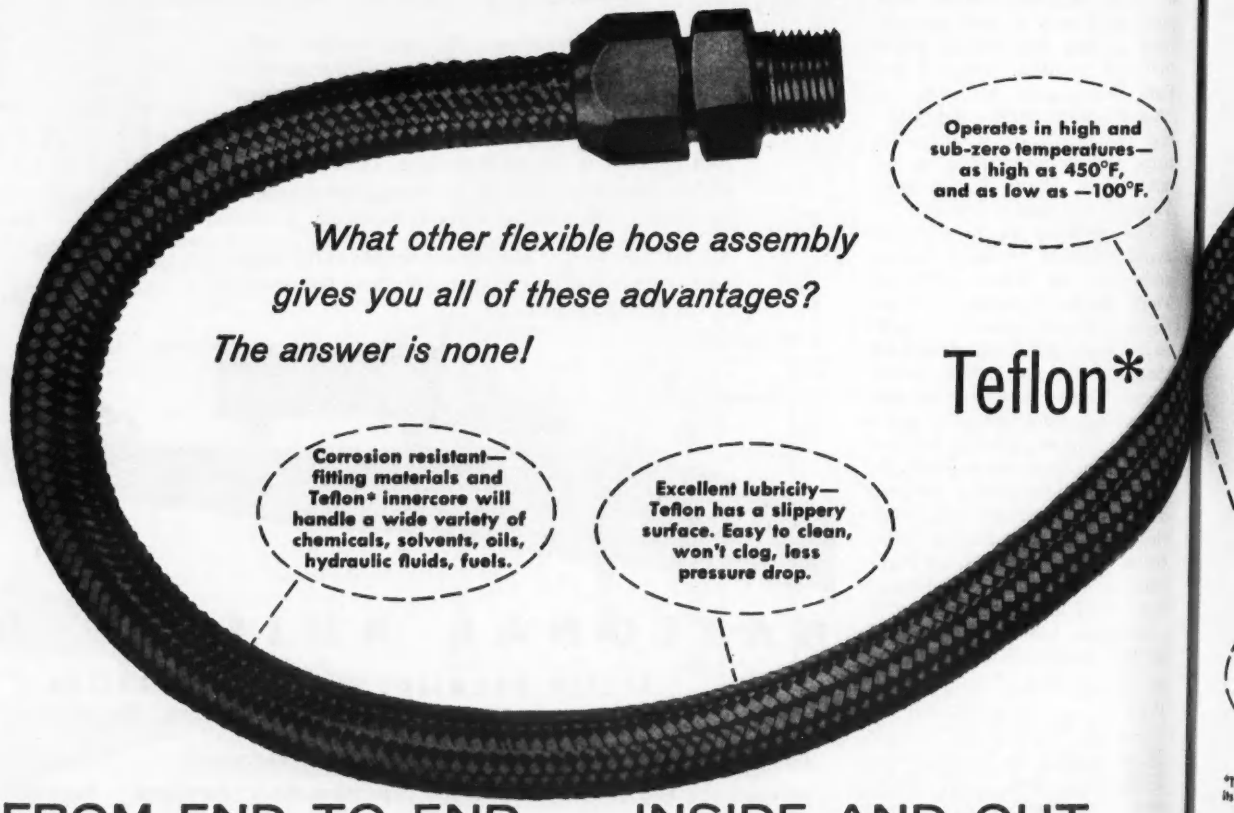
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What other flexible hose assembly gives you all of these advantages?
The answer is none!
Teflon*
Corrosion resistant— fitting materials and Teflon* innercore will handle a wide variety of chemicals, solvents, oils, hydraulic fluids, fuels.
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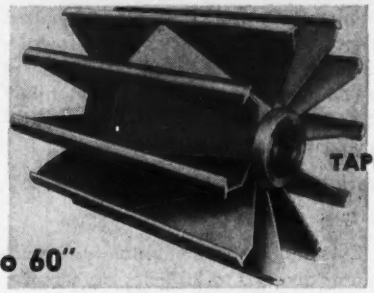
USE VAN GORP BELT SAVER PULLEYS



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Van Gorp Self Cleaning Pulleys offer individual wing construction that prevents any material build-up between the belt and pulley. Self cleaning cone design automatically discharges foreign material to the sides of the pulley. It is no longer necessary to spend valuable time cleaning material from the belt or pulley. Van Gorp Pulleys stay clean and insure proper belt alignment. Reduce your maintenance cost! Be sure you specify Van Gorp Belt Saver Pulleys with Dodge TAPER-LOCK bushings on all your conveyors or bucket elevators.

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The Teflon innercore makes Springfield "140" hose assemblies extremely flexible. Long fatigue life.

Hose Assemblies with Reusable Fittings

Springfield "140" Teflon Hose Assemblies are approved for 1500 psi systems. Nominal hose diameter ¼" to ¾". Male pipe and J I C female swivel fittings available from stock.

In which of these applications can you use Titeflex Teflon?

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Look in the yellow pages of your directory for the Titeflex distributor nearest you, or write direct for Titeflex Springfield "140" Catalog Supplement

Long life— Springfield "140" is unaffected by aging. Shelf life is practically unlimited.

*Teflon is a DuPont trademark for its tetrafluoroethylene resin.

TITEFLEX, INC., 509 HENDEE STREET, SPRINGFIELD, MASS.

. . . MADE RIGHT IN OUR OWN PLANT

Check 3851 opposite last page

Reactor scoreboard for 1957

US atomic industry completed 16 nuclear reactors, including 7 power-type and 9 research and test units, in 1957. In addition, the industry continued or began construction of 59 reactors, 35 power-type, and 24 research and test units. Orders for 10 new reactors were received. Purchasers included those in US and abroad.

Nuclear power plants for civilian use already in operation in US, under construction or planned, now number 23, with a total capacity of 1.3 million kw.

US and German firms form atom company

First jointly owned international company in German nuclear energy field has been formed by Demag AG, Duisburg, West Germany, and North American Aviation, Inc., Atomics International Division, Canoga Park, California. Known as Interatom (Internationale Atomreaktorbau GmbH.), the firm will be engaged in developing peaceful uses of atomic energy, including design and manufacture of reactors and other related products.

Price of U-233 listed at $15 per gram

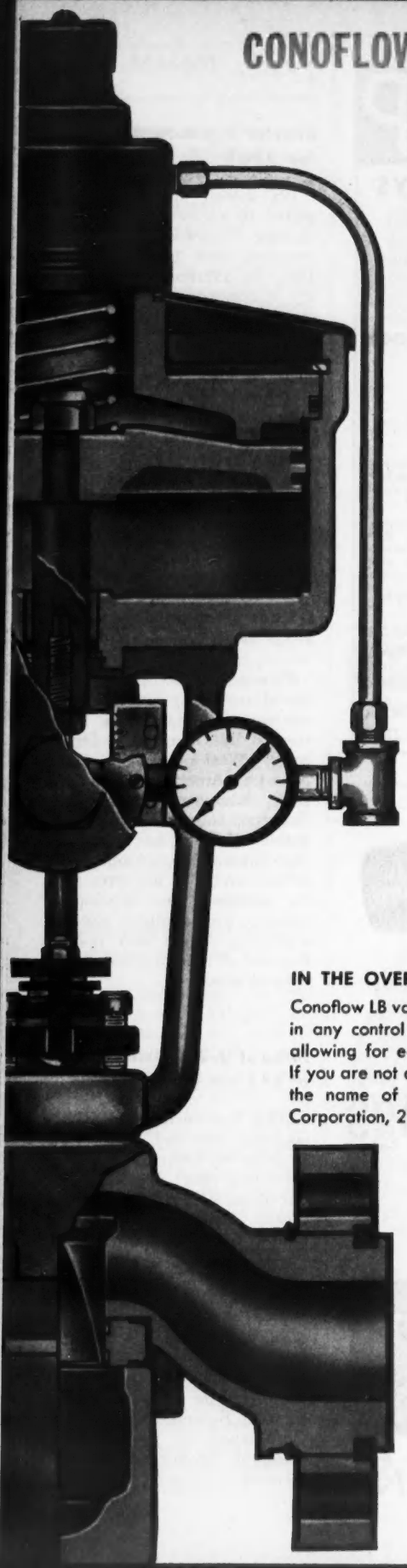
AEC has declassified U-233 specifications and prices. Up to June 30, 1963 the Commission will pay a guaranteed fair price of $15 per gram of U-233 produced in private atomic reactors in the US.

Plans for second Geneva confab

Final plans are just about completed for US participation in the Second International Conference on the Peaceful Uses of Atomic Energy, at Geneva, Switzerland, Sept 1-

To page 25

CONOFLOW LB CONTROL VALVES GIVE YOU *BETTER* CONTROL WITH *LESS* MAINTENANCE!



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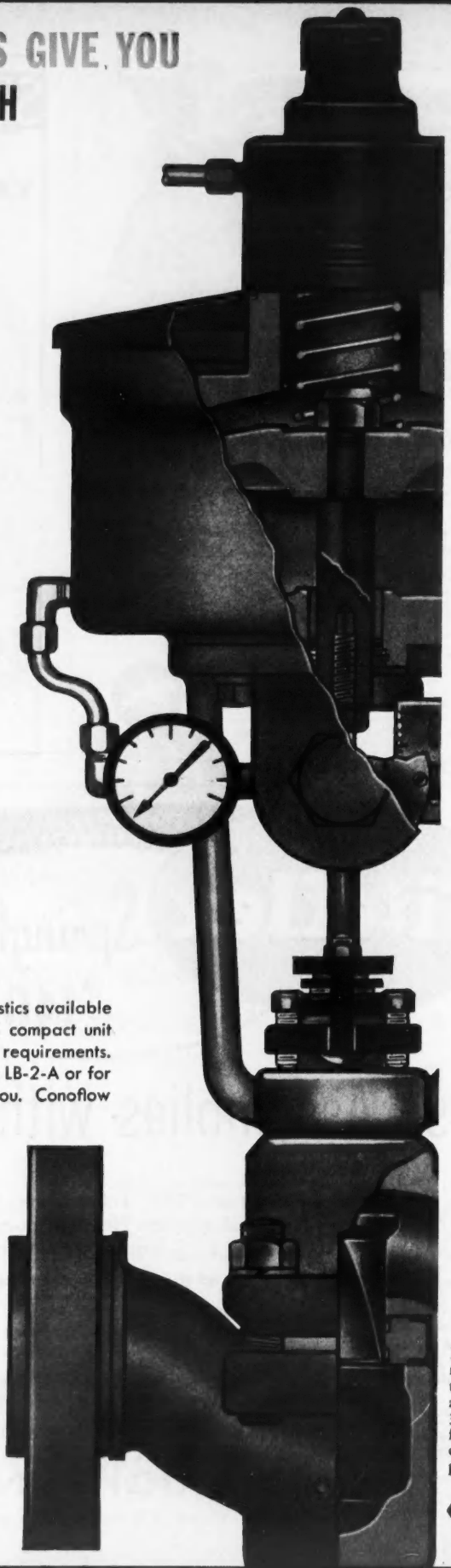

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Check 3853 opposite last page

NUCLEAR NOTES

From page 23

13, 1958. Invitations to prepare technical papers have been extended to scientists and engineers in about 4000 installations in the US. In addition to the papers, films and exhibits describing progress in peaceful uses of atomic energy will also be presented.

Costs high, interest lags in fuel reprocessing

Commercial reprocessing of spent nuclear fuel will not be a reality for some time to come, according to Dr. Norman A. Spector, vice president of Vitro Corporation of America, and president of Vitro International. Private interest in this field has been limited by the wide range of processing characteristics. Also, large capital requirements result in high processing charges. Costs incurred are not in line with commercial economics of power production nor competitive with charges offered by AEC to reactor operators.

Boron metal plant to be shut down

AEC has announced it will shut down the boron-10 plant near Niagara Falls, New York, by July 1, 1958. Operated by Hooker Electrochemical Company, the plant will be placed in stand-by condition. Current inventory is sufficient to meet demand for several years. Boron-10 is a neutron absorbing material useful in reactor shielding and control, and also for radiation detection instrumentation.

Aircraft reactor contract extended

AEC has renewed a contract with United Aircraft Corporation for the development of nuclear propulsion for aircraft. Original contract, entered into in May 1953, is extended to Sept 30, 1960. Work to be performed will cost about $15 million per year.

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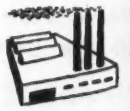
Check 3855 opposite last page

By most standards the chemical industry is very young, and its recent growth has been quite rapid. Today's marketing system hasn't always existed—not many years ago the chemical salesman didn't even exist. A plant was built, the material was produced, and the customer was told that he could come and get it.

This is all changed now, but some areas of controversy still exist—among them that of chemical distributors. Shall we use a distributor or shall we market the product ourselves? When should a distributor be brought into the picture?

These thoughts on chemical distribution, by a vice president of one of the leading chemical distributors, may help answer some of these questions.



FOR THE MANAGEMENT TEAM
MARCH 1958
CHEMICAL PROCESSING

The DISTRIBUTOR'S PLACE in modern chemical marketing

By J. K. WATKINS Jr.
Vice President
Merchants Chemical Company, Inc.

A chemical manufacturer can certainly well afford the sales expense of servicing his large customers, those who buy a major part of his output. He'll want to provide as much technical service as possible, and stay as close to the customer's problems and operations as he possibly can.

But sales and service to the smaller accounts—those who buy in small or less-than-carload lots—may well be a different matter. The sales expense may be just about the same as on a major account, the technical service necessary may be as high or higher — with much less revenue produced. This can change the sales economics considerably.

In most industries the place of the distributor is well recognized. Certainly the function of the wholesaler must be performed by someone—either the producer or some separate organization existing specifically to do that job. For the producer the only question is whether the wholesaling function can best be done by himself or by some independent distributor.

Let's Define the Term

What is an industrial chemical distributor? It is difficult to define this with any exactness because distributing companies vary greatly among themselves. Some restrict their activities to certain products or fairly narrow groups of products, some sell only one industry or a limited type of industry, and others cover industry generally. The location has much to do with the type of distributor existing there.

I think of the heavy chemical distributor as a company which buys carloads, truckloads, and tank cars for its own account, carries this merchandise in its own warehouse and storage tanks, maintains an adequate sales force for the territory it covers, and delivers to its customers with its own trucks. Principal function is to take in large lots of merchandise, store them, break them down into small lots, and sell them to the buyer whose requirements are for relatively small quantities of merchandise.

The producer is interested in sales coverage of all customers regardless of whether they are large or small. How can he best obtain adequate coverage of the less-than-carload account? He knows that his sales expense per call is such that he cannot afford to have his salesman solicit the business of the small buyer more than two or three times a year. In contrast, the distributor's salesman is calling on that same buyer every three or four weeks. It is profitable for the distributor's salesman to make frequent calls since he is selling not just a few items but a long list of items supplied by various manufacturers.

Local Nature an Advantage

Prompt delivery service to all accounts is of major importance. With his local warehouse and his own delivery equipment the distributor is in a far better position to render the kind of service the small buyer wishes than is the producer whose plant may be many hundreds of miles away. Of course, the producer could duplicate the warehousing and delivery facilities of the distributor, but again the question arises: Can this be justified economically?

One definite advantage that the distributor enjoys over the producer is the local nature of his business. In the very large metropolitan areas or in dealing with very large companies this may not make too much difference. But in Minneapolis, Milwaukee, Omaha, or Denver the buyer likes to deal with his neighbors —companies and salesmen he has known for years. In most cases the purchaser prefers to give his order to the salesmen for the local distributor, who pays taxes locally, than to the representative of the out-of-state corporation who will be shifted to some other territory next year. There is a goodwill element existing here which the out-of-town producer will have great difficulty in ever obtaining.

Not to be overlooked in this discussion is the problem of credit. By the very nature of his business the distributor is constantly dealing with the marginal account. With his knowledge of local conditions and his acquaintance with the individuals involved, he is in a better position than is the producer to decide whether or not the risk is worth taking. Why should the producer set up the credit facilities required to evaluate the small account? I was very surprised to learn recently that we, a distributor, have almost twice as many active accounts on our books as one of our major suppliers whose annual volume of business is fifty times greater than ours. As a matter of fact, for this particular producer we sell his products under his name to almost as many different accounts as the producer himself sells directly. Think of the credit problem alone which this producer would have should he decide to try to sell all these small accounts himself. And we are just one of many distributors for this producer.

We frequently hear about the cost of an invoice. To bill a small customer costs just as much as to bill a large one. In dealing with the less-than-carload market is it not preferable for the producer to bill a carload to one

distributor than to the twenty-five or fifty ultimate users of this carload? I'm sure that the accounting department of every manufacturer would be completely in favor of this obviously substantial reduction in paper work.

How About Resales?

One aspect of the chemical distribution picture which has always particularly puzzled me is the resale divisions which some producers have. Why should a chemical manufacturer be in the business of reselling—often to less-than-carload accounts—the products of other chemical manufacturers? When he can make a substantial margin of profit on the sales of his own products, how can he justify the handling of resale items on which the margin of profit is very small? It is true that he can offer a service to his customer by doing this, but certainly no one is going to get all the business from any customer. Would not the producer be ahead financially to concentrate his sales efforts on his own products and let the distributor handle the resale items?

Some producers are dubious about the value of a distributor because they are afraid that he will promote a competitive line rather than theirs. I will admit that this is always a possibility. If the producer's view of the distributor is merely that of "just another customer," then the distributor may not be too interested in effectively promoting the sale of the producer's line. If, however, the producer and distributor have built up a mutual relationship of trust for each other, this problem will not arise. I feel that it is up to the producer to instill in the distributor the feeling that he is not just another customer but a part of the sales force of the manufacturer.

In this general area I believe that there is considerable room for improvement in the sales policy of many chemical producers. I am sure that those who have adopted a sincere and realistic distributor policy have found that it has paid off in additional profitable volume.

Some producers have at times felt that the distributor's salesmen do not have the technical knowledge required to perform a really efficient selling job in the producer's behalf. How, they argue, can a distributor's salesmen have a thorough knowledge of our products when they have so many other items to sell? In my opinion, when the manufacturer gives the distributor a product or group of products to sell, he should also give his salesmen full technical information concerning the product. In the case of a newly developed product or unfamiliar item this is particularly important. When the manufacturer is cooperative in the matter of sales education, he need have no fear that the distributor's men are not equipped to do a technical selling job. The intelligent distributor today is more than willing to have his salesmen thoroughly schooled in all technical aspects of the products he is selling.

James Watkins Jr. was graduated from Princeton in 1940. After a term in the Army Air Corps, he received his LL.D. from the University of Michigan and practiced law in Detroit for a year.

He joined Merchants Chemical in 1949, and in 1951 was made vice president.

I am not one who believes that every new chemical produced should immediately be placed in the hands of the distributor. We are always looking for new products but only those new products which fit into our pattern and which can be sold at a profit—both to the distributor and to the manufacturer. For the manufacturer to say to the distributor, "Here is a wonderful new product; we don't know where it can be used, but go out and sell it," is a mistake. In the relatively low-profit and highly competitive field of the industrial chemical distributor, his salesmen do not have the time to do this type of promotional work. The producer himself, through his resources for market research and development, must ascertain the general areas in which a new product can be used. Once these are established, the distributor's salesmen can find additional outlets and volume for the product.

In the heavy-chemical field the question of carload accounts has sometimes created problems between the producer and the distributor. Some manufacturers have taken the position that all carload accounts should belong to them, and that the distributor should be restricted to the less-than-carload area exclusively.

A common situation is for an account to begin as a LCL buyer for a certain item and in time develop into a carload user. The distributor usually does not like to see a good-size LCL account switch to carload buying as this cuts down his margin of profit. As part of his sales job, however, he must advise the customer when his requirements are at the stage where the account would save money by taking in carloads. Today, most producers recognize this point of view and allow the distributor to continue to sell and service the carload account who has grown from a less-than-carload buyer. Some manufacturers even write this into their contracts with distributors.

Another facet to this problem is the question of whether or not the distributor should be allowed to solicit original carload business. This problem is perhaps somewhat more difficult than that just discussed.

The account which buys only an occasional carload of merchandise, say once or twice a year, presents about the same credit and accounting problems as the LCL buyer. In most instances it is not worth the manufacturer's sales effort and expense to handle such an account himself.

The difficult problem arises in the case of larger carload accounts in which the volume is clearly such that the producer can well afford to try to sell the account himself. The question might be considered in this light: If the producer already has the business, or a substantial part of it, he should not allow his distributor to try to sell the account; if he does not have the business, he should encourage his distributor to solicit it. If the producer's own salesmen cannot obtain the order and the distributor can, certainly the former should have no objection to paying the customary commission. The producer, after all, is obtaining business which he did not have before, and his principal interest is in selling the production of his plants.

It is estimated that total chemical sales in the United States today are roughly thirty billion dollars. Distributors account for around 20 percent of this total—about six billion dollars. The chemical industry is growing currently at an annual rate of approximately 7 percent. With the continuing rapid growth of this industry generally, and of the primary chemical producers in particular.

I believe chemical company managements will more and more recognize that constructive use of aggressive distributors' facilities can help them sell increased volume profitably.

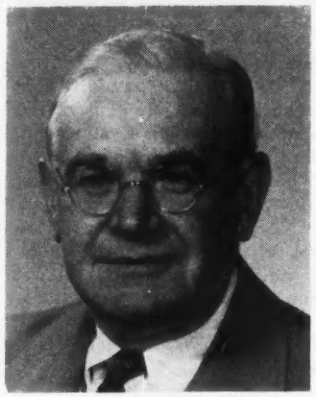
How do you sell — and why? The subject of whether or not to use chemical distributors has long been controversial and shows no sign of being settled in the near future.

To shed more light on the question, the Editors would like to know what you think about the role of distributors in today's chemical marketing. Send your comments to The Editor, CHEMICAL PROCESSING Magazine, 111 E. Delaware Pl., Chicago 11, Ill.

A 'capital investment' in the broad intellectual development of management personnel who will shape the future direction of the organization has been made to the benefit of both individual and company in . . .

Monsanto's advanced management school

FRANCIS J. CURTIS
Vice President for Personnel
Monsanto Chemical Company



FRANCIS J. CURTIS is a member of the board of directors and vice president for personnel of the Monsanto Chemical Company. He entered the company in 1915. The company's present system of procurement of technical personnel was started by Mr. Curtis in 1936.

He held the position of director of development (1939-1943) and was named secretary of Monsanto's executive and finance committees in 1943. Elected to the board of directors in 1949, Mr. Curtis became the company's director of industrial preparedness in Washington in 1950. He served as assistant administrator of the Chemical Rubber and Forest Products Bureau of the National Production Authority for six months.

Mr. Curtis received the Commercial Chemical Development Association's honor award for 1951 "in recognition of his 36 years of contributions to commercial chemical development in America." He served as president of the Society of Chemical Industry for the year 1952-53, and is a past president of the American Institute of Chemical Engineers.

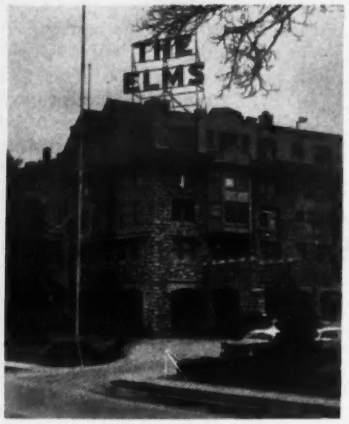
Sport shirts and strollers, reading lamps and textbooks were the order of the day for a group of Monsanto Chemical Company's executives when they returned to The Elms Hotel at Excelsior Springs, Mo., in January to begin the second session of the company's advanced management school. Students at this company-sponsored school are members of management just under the policy-making group. In underwriting its own school the company is, in reality, making a "capital investment" in the broader intellectual development of these men who, in the company's decentralized structure, accomplish the aims of the Executive Offices of the President today, and are the reservoir of talent to shape the future direction of the organization.

Corporate responsibility has been widening rapidly in the post-war years, and the view of the able manager can no longer be short-range and narrow. Since the majority of the men attending the school have been, in fact, specialists in fields which represent a virtual cross-section of industrial endeavor — manufacturing, accounting, sales, research, and other fields — the curriculum has been designed to broaden the students by making them aware of equivalent principles and performance characteristics of other specialists. Increased awareness, in turn, should result in reduced frictions and in more effective, spontaneous coordination for the benefit of the company. Appreciation of the broad industrial and social picture should be significant also in improved performance in higher-level positions to which participants may be assigned in the future.

Comfortable quarters and a "retreat" atmosphere are conducive to serious study

The concept of a management course sponsored, selected, and directed by the company was months in maturing. Men in responsible positions in the company, many of whom had attended advanced management schools at several universities, were asked whether they thought the idea worth while and, if so, were invited to offer suggestions as to the content of the course. The response was strongly in favor of our own school and a number of helpful suggestions were generated. Visits to other courses offered both by universities and by industrial organizations helped to shape our plans, but the current course is, to the

Monsanto's advanced management school — *From preceding page*



The Elms Hotel at Excelsior Springs, Mo. — "campus" of Monsanto's advanced management school

best of our knowledge, patterned directly after no other course. In fact, its broad curriculum and detailed structure are unlike any other now in existence.

Dean Ross M. Trump, of the School of Business and Public Administration of Washington University (St. Louis), was a general advisor during the course's planning stages, and several of his faculty have served as advisors on subjects in which they specialized.

Two-session Course

Some 140 personnel are participating in the program by invitation — not by "edict." The current session gives them the second three-week semester of a planned six-week course. The first session was completed in five consecutive classes running from January through April 1957, and the second session, now going on, will follow a similar pattern.

The initial course was not concerned directly with study of Monsanto operations, but rather, within a broader framework, treated both theory and practice of over-all industry. It was entitled A Look at the Techniques of Management and was divided into four primary subjects: Effective Administration; Accounting as an Aid to Management; Marketing Methods and Problems; and Economic Background for Management Decisions.

For example, Effective Administration in the first session considered, as main aspects, the fundamentals of dealing with people and of building an effective organization with them. In this category, also, the place of organized labor in industry today was studied.

The second session, Management in the Modern World, has the aim of a continued broadening in the large view of industry. Subject matter covers Business Economy in the American Scene; Business Economy in the International Scene; Financial Management; and General Management.

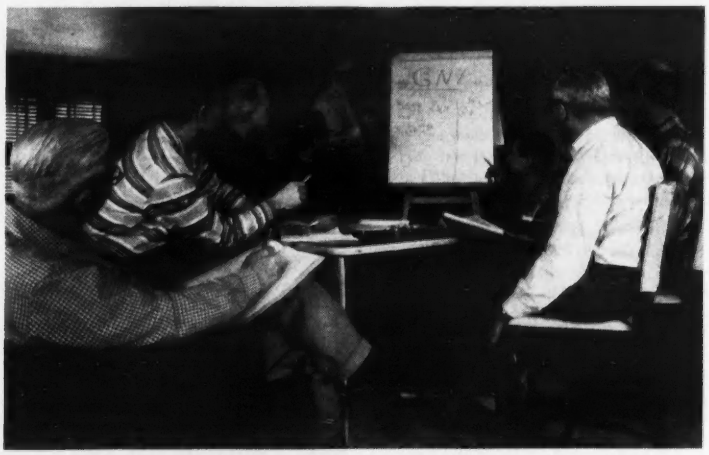
Each of the five consecutive classes is attended by 25 to 30 men. Faculty and students are gathered together at The Elms Hotel in the small town of Excelsior Springs, Mo., some 30 miles from Kansas City.

Right 'Atmosphere' Necessary

In choosing the site, Monsanto wished a spot of sufficient distance from company headquarters to insure a minimum of day-to-day business interruptions, physical quarters of comfort — not of luxury — affording individual rooms for the participants, and an atmosphere generally conducive to serious study. Dining facilities, meeting rooms, areas for lounging and reading were also of importance. And it was necessary that the location be easily and centrally accessible for faculty members, who stay at the school for periods ranging from one day to a week. The desired atmosphere included freedom from any wide range of social and recreational distractions, yet nearness to the elements of urban living to allow a "change of pace," primarily on weekends, if desired by the participants. It is interesting to note that only a minority of participants availed themselves of the week-end leave privilege during the first session, and during the entire session the students gave a convincing appearance of contented and interested scholars.

The faculty is made up of outside specialists — members of university faculties and industrial consultants — eminent in their own fields. Included in the universities from which faculty members for the 1957 session were drawn (largely from graduate schools of business administration), are Northwestern University, University of Chicago, Purdue University, University of Illinois, New York University, Indiana University, Columbia University, Ohio State University, University of Michigan, Harvard University, Dartmouth College, University of Pennsylvania, Washington University (St. Louis), Western Reserve University, and Case Institute of Technology. With the addition of Stanford University, the faculty for the 1958 session is made up from the same schools.

While in certain instances Monsanto specialists might — on the basis of experience and knowledge — have qualified as instructors, it is our feeling that the broad principles behind the school are best served by the teaching experience and objectivity of outsiders, expert in their specific fields.



Group discussions help specialists in chemical industry obtain broad view of economic and social structure

Course Routine

Actual course routine is made up of lectures, conferences or group discussions, business "case" considerations, and other generally used educational methods and techniques. Preparatory readings are assigned for each day's topics; corollary or auxiliary readings are also listed and available each day. But in general, the assigned texts, plus normal daily curriculum, require virtually full-time commitment of course participants. Experience during the past year, however, indicates that participants have been widening their auxiliary reading and maintaining the broad perspective encouraged by the course.

Slide films, motion pictures, charts, and similar standard aids offer variety and supplement the lecture and text-book approach. "Buzz" sessions, "role-playing," the "incident" method, and similar devices are used on occasion. The techniques involved are based on their relevance to subject matter of the day and the choice of the instructor who is covering that particular subject. Instructors have complete freedom to use techniques and devices of their own selection. Methods of instruction and details of subject coverage are neither pre-conceived nor strongly influenced by Monsanto.

Each class assembles initially on a Sunday afternoon. For each arriving group an executive officer of Monsanto is on hand to extend official welcome. Thereafter, the group assembles several days a week for periods from 8:30 AM to noon, and from 1:30 to 4:00 PM. Afternoons on one weekday and Saturday are free, but several "free" afternoons have been used for reading, study, and group dis-

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Recent headlines have drawn renewed attention to the tremendous funds associated with welfare and pension plans. Many times information on how these funds are used is not only not easily available but practically impossible to obtain. Here is the Government's plan for . . .

assuring honest management of pension and welfare funds

JAMES P. MITCHELL
Secretary of Labor

MR. MITCHELL draws on many years of experience in his discussion of welfare and pension plans. Prior to his appointment as Secretary of Labor he served as Assistant Secretary of the Army in charge of manpower and reserve forces affairs. During World War II he was responsible for labor and manpower problems affecting Army contractors, and administration of nearly one million civilian employees of the Army Service Forces.

He has served as personnel relations advisor, director of industrial relations, and operating vice president for several large industrial concerns. He was appointed to his present cabinet post on October 9, 1953.

Chemical Management Has Big Stake in Welfare Plans

While Mr. Mitchell's remarks are concerned primarily with legislation to protect employees and their families, management in the chemical processing industry has a heavy stake in seeing that pension and welfare plans are well and honestly managed (CHEMICAL PROCESSING, February 1958, page 41). Chemical companies spend almost 24% of their payroll for employee fringe benefits, of which a large portion goes to participation in health, welfare, or pension plans. And this amount is steadily increasing. A recent Department of Commerce survey shows that fringe benefits for all industry increased nearly six times in the period between 1929 and 1955.

Estimates indicate that existing welfare plans provide life insurance coverage for more than 37 million employees in the United States.* Pension plans, providing retirement benefits, are estimated to cover over 14 million employees. A congressional investigating subcommittee found that in 1954 some 75 million persons—employees and their families—look to welfare or pension plans for health, welfare, or pension benefits of some kind, with the number increasing yearly. Almost $7 billion a year go into the funds, of which more than $2 billion are contributed by the workers themselves.

It is our firm belief that the vast majority of these plans are soundly and honestly administered. Recent disclosures have served to focus attention on abuses which may be practiced in administration of employee welfare and pension funds, resulting in serious loss to workers and their families who are the beneficiaries. If the Federal Government can, by appropriate legislation, aid in eliminating the worst of these abuses, I believe the necessary action should be taken promptly.

The Administration's bill "to assure adequate disclosure of the financial affairs of each employee pension and welfare plan and to afford substantial protection to their beneficiaries" was introduced in January 1956. Continuing studies in this field indicate areas in which the original proposal might be improved. These improvements were recommended in my testimony to a special Subcommittee of the Committee on Labor and Public Welfare on May 27, 1957. They are now contained in the Administration bill which was introduced in the Congress immediately following my testimony. The legislation relies primarily upon disclosure to the beneficiaries, and to the public, of the financial operation of the plans. It is also designed to encourage appropriate State regulatory action and self-policing by the parties administering the plans.

*The exact number of employee welfare and pension plans in existence today is not known. The Senate Subcommittee on Welfare and Pension Funds estimated there may be, in all, some one-half million such plans and insurance policies of all kinds. Employees as well as employers contribute to the cost of a great many of these plans.

Provisions

Registration with the US Department of Labor would be required of pension, health, and welfare plans for which exemptions or deductions are allowed under the Internal Revenue laws, as well as plans which apply to employees in any industry affecting interstate commerce. This should adequately cover all areas of true Federal concern. Annual financial reports would be required. Obligation to register would be placed upon the persons responsible for the control, disposition, or management of the funds established by the plans. Criminal penalties would be provided for violations of and noncompliance with the act, as well as for false entries in any book, record, or statement required to be kept or filed, and for embezzlement and other unlawful use of fund money. Subpoena power and investigative authority would be included.

There is good reason why all plans should be registered. All beneficiaries are entitled to protection. Managers should be required to give an accounting of their stewardship in handling these funds. These plans in their totality have such importance for the security of the American people that the public interest justifies, at this time, registration and annual reporting of all of them.

Types of Plans

There are almost infinite varieties of welfare and pension plans. They are established by employers, by employee organizations, or by both. They provide many different kinds and combinations of pension, health, and welfare benefits. They are financed by contributions of employers, of employees, or of both. They are administered by employers, by employee organizations, or jointly, and their liabilities are funded by many different methods. Plans are unicollective bargaining and can cover a single plant, severlateral or established through al plants of the same em-

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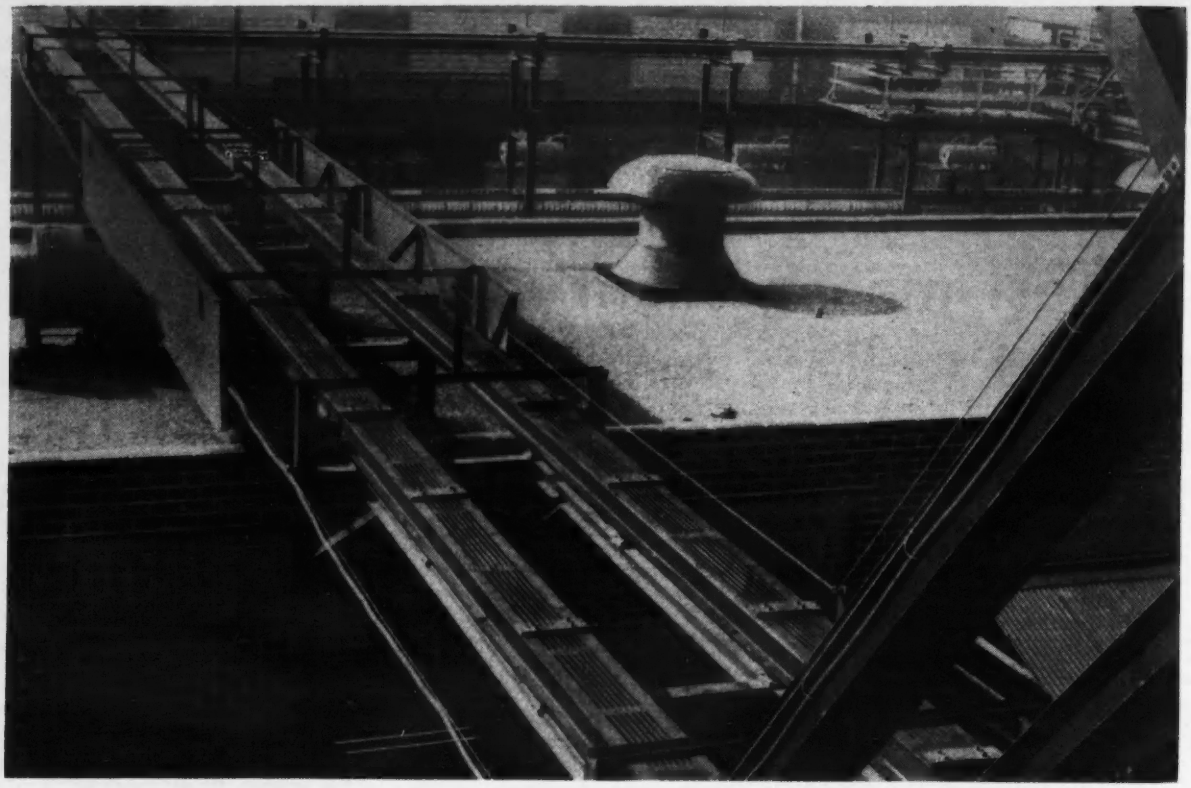

▲ Insulators are installed at bottom and sides to support the bus and brace against short circuit forces.

◀ Sloping aluminum bus is unsupported between buildings of different heights. Steel frames provide rigidity.

Alcoa Aluminum Bus Serving Ethyl's Sodium-Chlorine Plant

To transmit 30,000 dc amperes at 550 volts from one rectifier station to another, at a circuit distance of 700 feet, Ethyl Corporation engineers weighed the facts, then chose lightweight, corrosion-resistant aluminum bus conductors. In considering conductors, they found three big advantages with aluminum: it cost less per foot of conductor; weighed about 50% less than copper of the same current-carrying capacity; and, as a result of this lighter weight, also reduced the cost of supporting structures for the system.

This is the second aluminum bus conductor installation by Ethyl. The performance of the first, as well as its economy, led to this second installation. The bus system serves sodium-chlorine electrolytic cells. The natural oxide film on the aluminum protects the bus from further corrosion. This protective film also improves the heat-radiating characteristics of the bus, permitting cooler operation or additional load-carrying capacity.

Savings also appeared during installation. Shielded arc consumable electrode welding, because of its flexibility and speed, was used for the welded joints. Most of the welding was done on the ground where the supporting beams were assembled, facilitating installation and increased safety.

As in many industries, the electrochemical industry has found that bus systems of Alcoa® Aluminum are the modern answer to the need for economical power distribution. For complete information about Alcoa Bus Conductors, consult your local Alcoa distributor or sales office, or write to Aluminum Company of America, 2305-C Alcoa Building, Pittsburgh 19, Pennsylvania.

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Chemical processors look at material handling —

A management's approach to solving material handling problems — Francis M. Anable, **Victor Chemical Works** **page 33**

Centralize material handling responsibility — Tilden Batchelder, **Abbott Laboratories** **page 34**

Consider all avenues for best investment returns, Russell R. Major, **St. Regis Paper Co.** **page 36**

Wise purchase programming pays off — Howard A. Kreith, **Dearborn Chemical Co.** **page 37**

Material handling in chemical process industries —

Industrial truck trends reflect changing handling trends — Glen Johnson, **Clark Equipment Co.** **page 38**

"Tailor-making" mechanical conveyors meets chemical challenges — David Davidson, **Link-Belt Co.** **page 41**

The trend to bulk handling in containers — Carl D. Ackerman, **Tote System, Inc.** **page 44**

Pneumatic conveying — versatile tool for a versatile industry — Howard Sayre, **Fuller Co.** **page 45**

Moving chemical mountains by vehicle — James A. Suter, **The Frank G. Hough Co.** **page 47**

And —

Morningstar-Paisley speeds starch, gum handling and processing with packaged systems **page 48**

A trend in full swing: bulk unit containers handle zirconium raw material **page 58**

Scott Paper Co. removes long-time fire hazard from wood chip handling **page 64**

Francis Anable joined Victor as a chemical engineer in 1927, having his degree from Clarkson College of Technology in 1924.

His many positions with the company before becoming vice president in charge of production in 1949 brought him close to all of Victor's operations including much emphasis on the material handling phases of those operations.

A management's approach to . . .

Solving Material Handling Problems

FRANCIS M. ANABLE
Vice President in Charge of Production
Victor Chemical Works

No one can overstress the importance we must place on material handling as a means for combatting today's high operating costs. In the wake of continually increasing labor costs, the industry has had to rely heavily on this phase of operations for maintaining competitive positions.

As members of top management, it then becomes our job to see that modern material handling methods become adapted to our plant operations. As the keystone of the company's management team, we must see that responsibility is delegated to the proper people who will come up with the proper solutions to material handling problems.

For years Victor has been endeavoring to develop responsibility in its superintendents for the operation of each plant. It is up to the plant superintendent to use both the chemical and engineering departments for assistance in developing new ideas such as better plant layouts, improved yields, better control methods, and modern material handling methods.

Prior to the end of each quarter year, the superintendent submits his plant's estimates of capital expenditures for new installations, estimates for repairs and estimates of the monies that will be spent in each quarter on jobs that have already been authorized. Top management often first becomes acquainted with new projects from these reports.

Any material handling improvements appear on the superintendent's preliminary report. I should mention at this point that we insist on each plant listing all possible projects, and the curtailment, elimination or postponement of any submitted project is determined by my department after reviewing all lists and dove-tailing the requests with long-range planning. It is our belief that by insisting the superintendent submit all possible projects, each organization is constantly seeking better ways of producing chemicals and their thinking is not limited by budget controls.

Any material handling project, and these can be all the way from tank cars or tank trucks lined with expensive corrosion-resistant metals to small equipment used for control work, are submitted as an individual job. Each individual request for jobs in excess of $1500 is submitted to our office. The request is accompanied by the details of the proposed project, an estimate of the cost and the amount of savings that might be expected. Often we request a follow-up report in order to find out if the installed equipment worked as anticipated at the time of the request.

Top management is concerned only with the possible return on the investment, the effect the use of the equipment might have on the quality of our chemicals, and the assurance that the project under consideration fits into long-range planning. For instance, we probably would not approve a material handling project for the Chicago Heights plant in the departments that will be revamped in line with the long-range program of transferring some of the larger tonnage operations from Chicago Heights to Victor's new plant, which will be built along the Illinois waterway.

Also top management is the only one in a position to view the overall effort of altering a material handling procedure. If we should speed up operations at one plant, how will this affect operations at our other plants? What effect will it have at our customer's plant? These are questions only top management can decide upon.

As our company has expanded its operations, we're now building the eighth Victor plant at Richmond, California, the advantage of an exchange of ideas has become increasingly important. Our method of accomplishing this exchange is to hold one meeting each year at our company headquarters in Chicago.

For this meeting, our plant superintendents, our chief engineer, the director of personnel, director of research, chief chemical engineer, chief chemist, and our Chicago production staff are brought together and the various problems, i n c l u d i n g material handling, are discussed in an informal manner. This is certainly not a departure often used by many companies to produce better managers, but the results of these meetings have been extremely successful for us.

The chemical industry is, and will continue to be, in a large measure dependent upon the nation's equipment manufacturers for improvements and innovations for material handling. During the past decade, they have made many major contributions which have been essential to keep our industry's costs from skyrocketing, and top management is well aware of the need for even more improvements in the competitive period ahead. ■

CHEMICAL PROCESSOR Looks at Material Handling

• PLANT SUPERINTENDENT

For effective management . . .

Centralize Material Handling Responsibility

TILDEN BATCHELDER
Superintendent, Materials Control
and Inventory Management
Abbott Laboratories

Tilden Batchelder has been superintendent of materials control and inventory management at Abbott Laboratories since 1955. He was assistant manager of the planning department at Abbott from 1949 to 1954. A major in chemical engineering at the University of Michigan and Ohio State University, Mr. Batchelder also studied industrial chemistry at Northwestern University. In 1951, he received a Master of Business Administration degree from the University of Chicago where he was enrolled in the executive program.

During the past several years, the chemical processing industries have made considerable investments in capital goods, tools, equipment, production, and storage space. It would seem that now is a good time to take a second look at material handling from the point of methods improvement and effective management of equipment and personnel.

This just may be the time to consider the establishment of centralized responsibility for handling materials.

Industry has been aware of the importance of material handling for some time. It has recognized that the handling which occurs in actual production operations is subject to closer control than the handling which precedes and follows production — that is, the receiving, storing, and shipping, and the substoring and rehandling which occur in these areas especially when space becomes critical.

Production in the chemical, pharmaceutical, and other allied industries involves the coordination and close timing of the movement of large volumes of many different kinds of materials.

These materials vary greatly in unit sizes, weights, shapes, and compatability with each other. Some of these materials, for example, are highly combustible; others are volatile; and still, others are corrosive. Some are a combination of all three. Considerable knowledge of the characteristics of the various materials handled is required in order to move and store them with a minimum hazard exposure.

Inventory Factor

Inventories, a critical economic factor in business today, have to be carefully managed. And, this has to be not only from the point of the inventory investment itself, but also in the consideration of the space it occupies and the cost of labor and equipment required to handle and rehandle it.

All materials must be carefully checked, sampled, and inspected before they can be accepted into production and finished storage. Great care must be exercised to insure exactness in identification and location from the time the raw material is received until it is shipped as a completely finished product.

And then there is the trend toward automation. It necessitates the careful coordination of non-automated operations with the automated ones. There is even the problem of maintaining precision requirements in such materials as packaging supplies. Even such items as chipboard cartons must be stored with care if they are to meet the close tolerances of today's automatic cartoning machine.

An Approach

One desirable approach to better management of the material handling situation in the chemical processing industries would be to have responsibility centralized in one line authority with a staff mechanical engineer and industrial engineer attached. It would seem logically sound that this would present a good potential for coordination, utilization, and maintenance of material handling operations.

This authority would be responsible for the effective utilization of equipment, personnel, and unitized load storage space; for the coordination and development of unitized receipts from vendors and unitized shipments; for equipment standardization; for proper maintenance and replacement. In summary, he would be responsible for the movement of all materials for the receiving docks into and out of the warehouses, to and from the production centers, and to the shipping area. He would be responsible for the equipment involved, the personnel, and the methods used.

If each production center is allowed to purchase and control its own equipment, personnel, and warehousing, overlaps will be most certain to occur. The inevitable result is to increase the cost of handling materials through ill use of equipment, man-hours, and space.

For example, there will be less standardization in equipment.

This results in more complicated maintenance problems from the variety of parts to the production center's loss while the equipment is in the shop. Space and equipment utilization will be much more difficult to control as each individual center will be prone to acquire an excess of space and equipment.

Today, industries have grown into great sprawling mammoths with considerable investments in such material handling equipment as pallets, lift trucks, transporters, automatic pallet loaders, bulk handling equipment, and conveying systems.

Take, for instance, fork trucks. They represent an investment of from $4000 to as much as $8000 or $10,000 per unit. It is not unusual nowadays to have a quarter of a million dollars invested in such vehicles alone. Add to this the cost of thousands of pallets, hundreds of trailers, a multiplicity of conveyors, communication systems, warehouses, and the logic of centralized responsibility becomes more apparent.

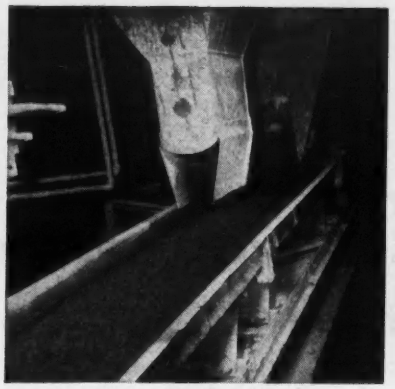
The observations expressed here are not implied to be a panacea for all material handling situations. They are suggested as one possible approach to a situation from the plant management organization's viewpoint. ■

"I said, are you still doing research on our odor control problem?"

Thanks to Harold Money, E. I. du Pont de Nemours & Co., Inc., Wilmington Delaware.

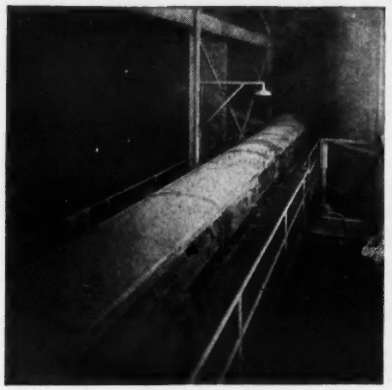
For smooth, surge-free flow of materials
. . . choose LINK-BELT Oscillating Conveyors

PELLETIZED IRON ORE is discharged from furnace to 36-in. wide Link-Belt Torqmount oscillating conveyor. This heavy-duty conveyor is for capacities to 100 tph and over.

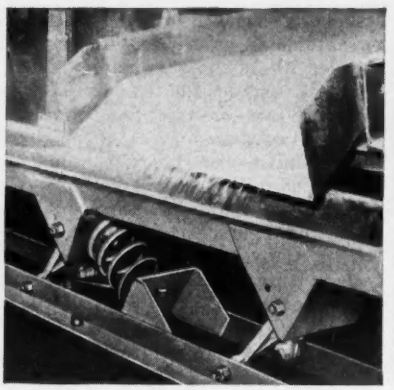


DAMP, STICKY ROOFING GRANULES flow smoothly from mixer to dryer on this Flexmount oscillating conveyor. "Positive Action" oscillation assures continuous, uniform flow.

GLASS CUTTINGS from car and truck windows are handled efficiently and safely by space-saving, under-floor oscillating conveyor. Metal troughs resist abrasive wear.



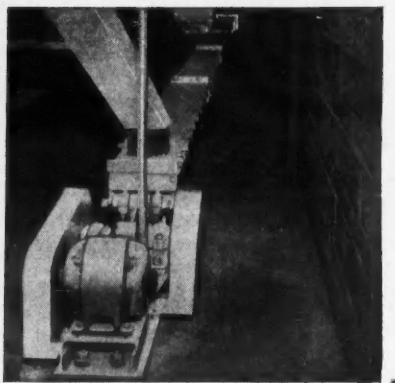
CRUSHED CALCIUM CARBIDE—as hot as 1700° F—is no problem for Torqmount oscillating conveyor at this plant. It's enclosed to confine dust, prevent entrance of moisture.



LIMESTONE and other materials containing dust or lumps the width of the conveyor trough are handled with minimum power demand on Coilmount conveyors.

THREE GRADES OF SALT are carried simultaneously by each of two partitioned Link-Belt Flexmounts. Deep, one-piece metal troughs are leak-proof . . . prevent spillage.

BAUXITE SINTER up to 300° F is carried on 36-in. wide heavy-duty oscillating conveyors from coolers to silos at 105 tph. Conveyors are spring mounted, dynamically balanced.



CORN PRODUCTS at a food plant are prewarmed as they travel in these insulated conveyor troughs. Self-cleaning troughs aid sanitation . . . prevent material buildup.

Sharp abrasives to delicate flakes . . . sticky granules to free-flowing powders —these hard-to-handle materials and many more are carried effectively on Link-Belt oscillating conveyors. Their *positive action* smooths out surges—assures uniform, continuous feed even under sudden overloads. It's combined with *natural frequency* to minimize power requirements.

Your nearest Link-Belt office can give you full details. Or write for Book 2644 on Coilmount and Book 2444 featuring Torqmount and Flexmount types.

14,634

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Check 3857 opposite last page

CHEMICAL PROCESSOR Looks at Material Handling

• COMPTROLLER

Repair or replace?
Purchase or lease? —

Consider All Avenues for Best Investment Returns

RUSSELL R. MAJOR
Assistant to Comptroller
St. Regis Paper Company

Russell R. Major has been very active in material handling circles, having taken part in various discussions on the financing of material handling equipment.

A graduate of St. John's University in Brooklyn, Mr. Major has served as a field accountant with the Turner Construction Company and as statistical officer, Air Force Adjutant General before assuming his present duties as Assistant to the Comptroller of the St. Regis Paper Company.

Today everyone hears the expression "Tight Money." One of the effects of the tight money condition is to cause financial executives to review all capital expenditures with more than ordinary care to insure that their companies are protecting their cash positions and are obtaining the best possible returns on capital invested.

Expenditures for material handling equipment are no exception to the rule. Because of the relatively short life of this type of equipment, as opposed to plant additions, machinery and equipment, etc., when requests are received for the purchase or acquisition of material handling equipment, the financial people immediately raise the question, "Is it better to repair or replace?" Before a proper decision can be arrived at, a careful study should be made of the various factors involved.

Repair or Replace?

Before making the decision to repair a unit, it must be determined whether or not it is economical to do so. The mere fact that a company desires to retain cash for expansion of productive facilities is not sufficient reason to justify a decision to repair. Generally a plant manager can repair equipment without executive approval and they frequently do so without looking into the economics involved. They then pride themselves on the length of time they operate their equipment. However, careful analysis may prove that their maintenance costs over the extended life of the equipment frequently exceed the cost of acquiring one or two new units during this span.

We must also bear in mind that repaired equipment will generally have more donwtime, with the attendant loss in production, than more modern equipment which generally incorporate cost-saving features. The intangible factor of the operators' morale must also be taken into consideration as new equipment generally instills efficiency whereas older equipment has a tendency to foster carelessness.

Buy or Lease?

If the decision is made to replace the equipment, the next question is should we buy it or lease it? Each company has different problems and naturally each situation has to be evaluated separately. However, generally speaking, the following points should be considered:

- Is the company growing and expanding?
- Does it have funded debt?
- Does it have surplus cash with no immediate need for same?

If the company has surplus cash with no plans for utilizing it, then purchasing equipment probably is the best decision. The approximate 2 or 3% return on investment after taxes, which will be netted by investing in material handling equipment, is better than having the money idle.

If the company is expanding and has funded debt, then conservation of capital is essential. Money should be allocated to projects and improvements which will result in the best return on investment. Dollars should generally not be spent if the end can be achieved in other fashions. We then should seriously consider leasing.

What factors should be considered in leasing? The question of the life of the equipment is, to me, one of the most important in making the decision. If the equipment can be used economically for a period longer than ten years, it should be purchased. If the expected economical life is under ten years, *serious consideration should be given to leasing.*

We must also consider how leasing affects the company cash position as opposed to purchasing and its effect on a company's return on investment.

For ease in making comparisons in answering the above questions, let us assume that the material handling equipment desired costs $100,000 and its expected life is five years, capital investment should earn 10% after taxes, and the equipment will have a $10,000 residual value at the end of the five-year period.

First, let us consider return on investment. Under leasing, the capital required for the equipment would be the monthly or quarterly payments made to the leasing company. Assuming that we would make equal monthly payments for five years, the income loss after taxes on money paid for rentals during the five-year period would be approximately $14,375. Under ownership, using the five-year sum of digits depreciation and generating cash in this fashion, the income loss after taxes to the company on invested capital would be $36,665.

Secondly, we should consider cash position. Assuming the conditions outlined above, under leasing the average annual cash investment over the five-year period would be approximately $34,500 each year.

Under ownership, the average annual cash investment over a five-year period would be $70,000, including the cash received for the residual value of the equipment upon liquidation.

As we stated earlier, each company's situation must be examined on its merits before a decision is made to lease or purchase equipment. However, there is one unrefutable point. Material handling is a science. If a careful analysis is not made by experienced technicians or material handling consultants, many thousands of dollars may be wasted in improperly designed equipment or in improperly designed storage and warehousing.

In today's constant search for methods of reducing costs, a complete review of the company's material handling problems may prove very rewarding. ■

CHEMICAL PROCESSOR Looks at Material Handling

• PURCHASING AGENT

Wise Purchase Programming Pays Off

Howard A. Kreith has been general purchasing agent for Dearborn Chemical Company since 1951. He has had over 30 years' experience in purchasing, twenty of which were spent with the Pepsodent Company, a division of Lever Brothers. He has also had purchasing experience in the machinery field and was at one time connected with a drum and pail manufacturing firm.

HOWARD A. KREITH
General Purchasing Agent
Dearborn Chemical Company

Lately, we have been hearing a lot about 1958 and the profit squeeze.

In many companies management is going to be looking for highly effective cost reducing measures. Engineers are going to be re-evaluating processes and operations. Keener approaches to purchasing are going to be called for by management.

In many cases, when planning a new program, it will prove rewarding to include the purchasing agent in the initial planning stage. This is especially important in the development stages of coordinating a new material handling plan.

If the introduction of such a new handling system is going to have far-reaching effects on future purchases for other departments or plants, the purchasing agent should be made aware of this. He will then be able to plan for handling these situations when they arise.

When the plan is based on drawing up a contract to have an outside firm handle the engineering and installation of a material handling system, equipment purchases are pretty well taken out of the purchasing agent's hands. However, because of his many contacts with sales engineers, he is often able to make many valuable suggestions and recommendations. He should be represented on the committee in the planning stages.

More often, the introduction of a new handling system is going to effect changes in the packaging and shipping of a final product. The purchasing agent should know at the early stages what the packaging needs are going to be with the end result relative to the needs of the sales departments.

In the purchasing of individual equipment, the same thing holds true. If the purchasing agent is brought in at the initial planning stages, he is able to understand better the existing problem. With his past experience in making similar equipment purchases, he again is able to suggest and recommend.

Once the purchasing program has been approved by the Finance Committee, the comptroller, or other necessary individuals, then a tentative outline of the desired equipment is developed from the recommendations arrived at in the consultations with the engineers and production staff. Inquiries sent out to manufacturers should request (besides prices) suggestions and comments. Frequently, the manufacturers quoting on the proposal will make suggestions concerning the design and function of the system. We at our company recognize the fact that a sales engineer for material handling equipment is an expert in his own field. Their comments and recommendations are seriously considered.

Working through our suppliers, we attempt to locate other plants having systems in operation similar to the one we are proposing. We request permission to visit these plant and observe their systems in actual operation. We ask for information on likes and dislikes, breakdowns, ease of maintenance, and, if available, cost of upkeep. The purchasing agent will use the information gained from these visits as another factor in rendering his decision.

With all this information in hand, the final step in the analysis can be made. This is the highly important comparison of initial cost with production speeds and maintenance costs. Operating speeds for various prices of equipment in the system will be generally equal for most manufacturers quoting on the job. It is the responsibility of the purchasing agent to look critically at the initial costs of installing the systems of competitive manufacturers. He must also consider thoroughly the possible maintenance expenses which might occur during the expected life of the machine.

Wise planning in the early stages will pay off handsomely for the company. Relations between purchasing and other company departments will be on the best level. Complaints and controversy will be largely eliminated. Acting under a clear policy will result in elimination of pressures, allowing ample time for careful, thorough studying and wise purchase programming. ■

MATERIAL HANDLING in Chemical Processing

• INDUSTRIAL TRUCKS

Truck Trends Reflect Changing Handling Trends

GLEN R. JOHNSON
Director
Materials Handling Development Center
Clark Equipment Company

Glen Johnson joined Clark Equipment Company seventeen years ago as a graduate from Ohio State University. Today, he is very active in all material handling research and development activities for the company, and recently has been appointed to Clark's Administrative General Staff.

He is also quite active in numerous material handling societies, including a position as chairman of the Definitions Subcommittee of the MHI Pallet Standardization Committee, under the auspices of both the American Standards Association and the Society of Industrial Packaging and Material Handling Engineers.

Many phases of mechanized material handling were pioneered long ago by the chemical process industry because it faced problems that did not become acute in other manufacturing industries until recently.

Chemical processors have always had to transport large amounts of relatively low-cost materials. Simple carts or other primitive machines that were satisfactory in furniture factories, for example, were unsuited for moving tons of ammonium nitrate or thousand-gallon batches of paint.

There is every indication that the chemical process industry is continuing its lead over other manufacturing activities in application of new material handling equipment. The need for cost-cutting continues, despite earlier progress.

The following increases in material handling vehicles have been made by chemical processors in the past three years, compared with the 1952-55 period:

- 34% more electric rider-type fork trucks have been put to work;
- 80% more electric hand trucks have been added;
- 60% more engine-powered fork trucks have been acquired by the industry.

Definite reasons lie behind the choice of various types of vehicles — fork trucks and powered hand trucks — and electric, gasoline, LP Gas, and diesel power units by specific chemical plants.

Electric rider trucks have long been popular in the chemical industry, so the 34% increase of the past three years is not an entirely accurate measure of their relative use.

The large increase in use of electric hand trucks stems primarily from recent availability of greater capacity units, improved power components, and thorough cost analyses extending down to operations of individual departments and individual operators.

Engine-powered trucks have gained in popularity because of a trend toward larger on-site warehousing operations, increased use of outdoor storage, and trends toward larger unit loads on pallets or in special-purpose containers.

'Explosion-proof' Electric Trucks

Electric power is the most common in chemical plant material handling vehicles where product contamination is a significant factor. Absence of exhaust gases plus the ease of conversion of an electric unit to "explosion-proof" operation are strong operating benefits to the average chemical plant. (Only electric vehicles meet Underwriters Laboratories EX specifications.)

Preset speeds of electric trucks result in a steady production rate, regardless of the proficiency or age of the operator. With fewer controls to manipulate, the average operator learns to drive an electric fork truck or powered hand truck faster than any other material handling vehicle.

On hauls of less than 50 feet, the electric fork truck has the greatest handling capacity of any vehicle of the same size because of its instant response and faster acceleration.

Extreme flexibility and low cost are responsible for increasing use of electric hand trucks. Used almost exclusively for short-haul, indoor runs, the small vehicles combine high capacity, narrow-aisle maneuverability, and around-the-clock dependability. Recent improvements in storage batteries, motors, speed controls, and recharging equipment indicate further application of powered hand trucks to what are now regarded as marginal opportunities for cost reduction.

Engine-powered Units Up 60%

The substantial 60% increase in engine-powered fork trucks is an indication of progress made by chemical process plants in broadening the application of mobile handling equipment. Units of up to 40,000 pounds capacity are taking over bulk handling jobs formerly done by more expensive, less maneuverable equipment. Larger, faster, and more powerful fork trucks made possible vast additions to outdoor storage areas without relocation of rail sidings or truck docks.

Increased use of automatic unit load assembly machinery has resulted in acquisition of larger trucks to move palletized loads, rather than individual drums or cases of chemical products. Speed of the assembly machines has required a corresponding increase in speed and capacity of fork trucks to move the unit loads. In most cases, this has required an engine-drive fork truck, especially in modern, one-story plants with widely separated assembly and storage areas.

Gasoline models remain the

most popular of all engine-driven models. Low initial cost, easy maintenance by mechanics of average skill, universal availability of fuel, and ability of torque converter equipped models to withstand occasional overloads offer a combination of benefits, unmatched by any other vehicle.

Use of LPG Units Soars

Liquified petroleum gas powered trucks have shown a spectacular increase in the chemical process industry in recent years. The number of LP Gas units in service during 1952-55 was negligible. In 1957, 20% of all engine-powered trucks manufactured were designed to use LP Gas.

The chemical process industry itself is one of the major reasons for the rapid increase in numbers of LP Gas fork trucks. The industry has promoted use of one of its own products as fuel and has used LP Gas vehicles where gasoline or diesel exhaust fumes might contaminate products.

Again following the chemical process lead, other industries are learning that the clean-burning fuel adds to engine life, lowers routine maintenance costs, and reduces the downtime lost through engine malfunction.

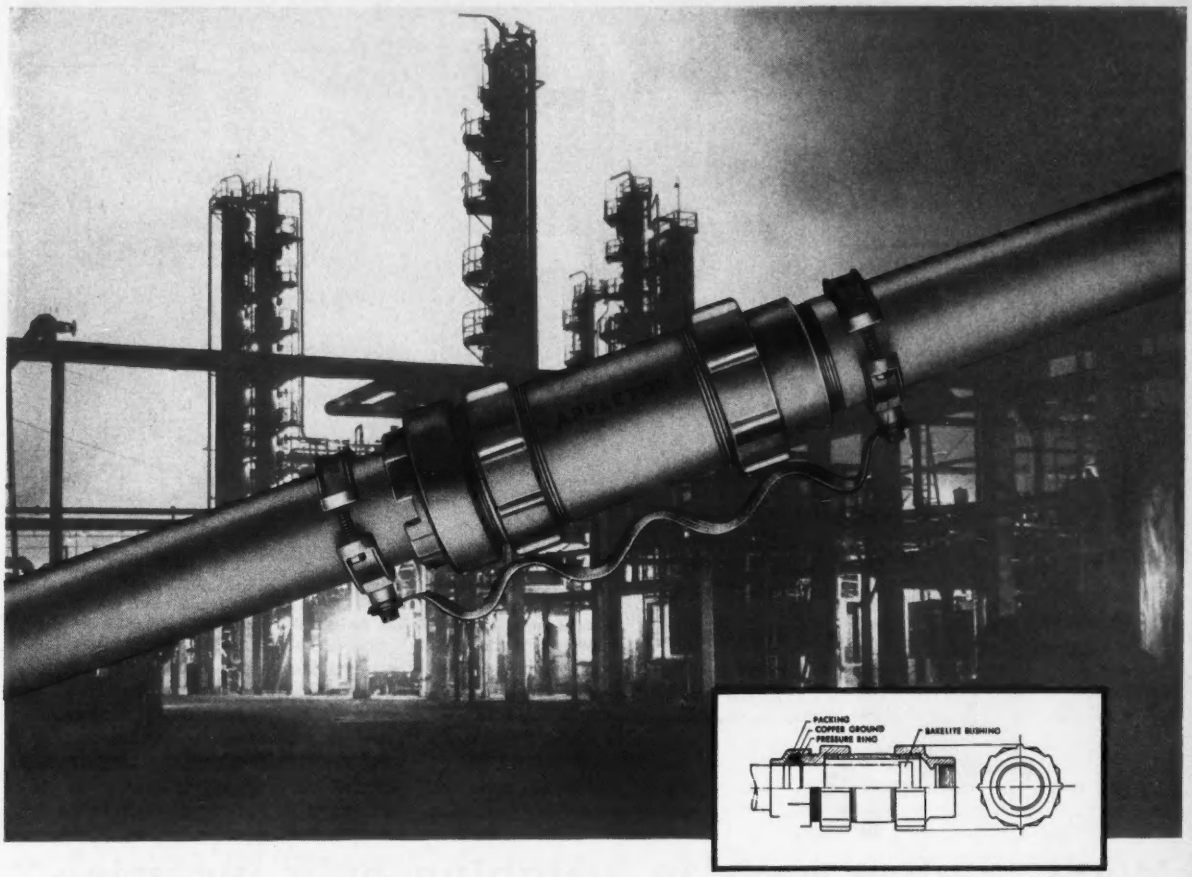
Diesel Trucks for Outdoor Work

Diesel-powered units are definitely in a minority in chemical plants, but their numbers have increased slightly in recent years with growing use of large outdoor fork trucks. Diesel fuel economy has been more important in Europe, however, and the number of small fork trucks with diesel power has risen steadily overseas since the war.

Specialized attachments have enabled chemical plants to speed handling of unusual products or odd-sized containers. The traditional wooden pallet has been eliminated in many plants by various clamping attachments that can hold and lift a number of cases, boxes, barrels, drums, bags, or other containers.

Bucket attachments and hoppers have simplified the handling of bulk material,

APPLETON® "XJ" Conduit Expansion Joints



Relieve the *strain* of expansion and contraction on long runs of rigid conduit

Temperature changes place a terrific strain on all long conduit runs. To relieve this potentially dangerous condition, it is best to install APPLETON "XJ" Expansion Joints at frequent intervals along the entire system. These weatherproof joints, for use with heavy-wall conduit, have a metallic packing and a bonding jumper to assure the entire conduit system remains a continuous electrical conductor. The jumper, installed in accordance with U. L. recommendations, gives double protection against extreme expansion movement reducing the effectiveness of the metallic bond.

As the conduit is inserted in the joint, a bushing is placed on the end in the manner shown. This bushing permits maximum conduit movement and yet the conduit can never pull free of the joint. The APPLETON "XJ" Conduit Expansion Joint features a metallic packing and pressure ring at the flexible end to keep the joint weatherproof at all times.

Wherever a long run conduit installation exists, the need for APPLETON "XJ" Expansion Joints exists. Interior or exterior, from Texas to Maine, temperature strains do exist, so take advantage of APPLETON'S product research program to give you the precision products you require . . . APPLETON "XJ" Weatherproof Expansion Joints for all long run conduit installations.

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permitting a fork truck to scoop up a chemical in the process area and dump it directly into railroad cars, trucks, or other bulk shipping vehicles.

One of the latest developments—a collapsible rubber container that holds as much as 370 cubic feet of light material such as carbon black—is easily transported by fork truck.

Chemical plants have further speeded loading of trucks and boxcars by use of side-shaft attachments on standard fork trucks.

The side-shaft attachments permit shifting the load for rapid positioning aboard containers with limited door clearance. ■

ASME to hold national conference on material handling in June

Plan to foster material handling as a science

A national conference on material handling, the first to be sponsored by the American Society of Mechanical Engineers since 1949, will be held in conjunction with the National Materials Handling Exposition, scheduled for June 9 to 12, 1958, in Cleveland.

Describing material handling as the "backbone of automation," **John C. Somers**, chairman of the society's material handling division, states purpose behind program: "The need for a new appraisal of this fast growing engineering science is an imperative one.

"Few engineering problems which face management today are as important as material handling. Only ten years ago it was virtually unknown as an important factor and some of the practices and equipment adopted became outmoded as soon as installed.

"Despite a decade of constant effort, material handling remains one of the few places where substantial cost reduction can be effected."

(For more information on this conference contact the Materials Handling Division, American Society of Mechanical Engineers, 29 W. 39th St., New York, N.Y.)

MATERIAL HANDLING in Chemical Processing

• MECHANICAL CONVEYORS

David E. Davidson joined Link-Belt Company in 1924. After serving in a variety of engineering assignments and as a sales engineer, Davidson was named district manager of the Indianapolis district sales office in 1943.

He was elected vice president for sales in 1950, becoming a director of Link-Belt Company in 1951.

He holds a BS degree in mechanical engineering from Illinois Institute of Technology.

'TAILOR-MAKING' Meets Chemical Challenges

D. E. DAVIDSON
Vice President
Link-Belt Company

The material handling requirements of the chemical processing industries create a need for more types, kinds, and variations of mechanical conveyors than for any other industry.

Although few unusual problems are involved in handling containers during packaging, warehousing, and shipping operations, the wide diversity in the characteristics and behavior of the bulk materials pose problems that tax the ingenuity of material handling engineers. An original bulk raw material may be processed into several different forms, each of which may require such handling operations as *feeding, conveying, elevating, storing, mixing, weighing, proportioning, and batching.*

When sufficient materials are available for studying and testing, experienced engineers can select conveyors to handle them successfully. Standard equipment is available for handling bulk materials with extreme variations in such fundamentally important characteristics as lump or particle size, specific gravity, moisture content, hardness, flowability, abrasiveness temperature.

However, in the chemical processing industries, it is often necessary for conveyors to handle materials having characteristics that are uncommon or relatively unimportant in other industries. A few examples of these characteristics and their influence on conveyor design are briefly outlined below:

Avoiding Contamination

Contamination of some products may result from reaction with the materials of which the conveyor parts are made. In some cases, this may be avoided by the use of non-contaminating alloys which usually require tests and careful inspection during fabrication. Often, special welding procedures and finishing operations are also needed. Other chemicals may require coating, plating, or even lining conveyor parts with rubber or other nonmetallic material.

Contamination, which may occur when two dissimilar materials are handled alternately in the same conveying medium, depends, for selection of conveyor type, upon the degree of tolerance permitted. When contamination must be eliminated completely, selection is confined to a few types, such as belts and oscillating troughs, which can be used effectively with a moderate amount of inspection and manual cleanout.

With increased tolerance, the effectiveness of certain other types of conveyors can sometimes be improved by close clearances, careful consideration of conveyor speed, the use of oversize conveyors, and by such auxiliary devices as water sprays and air jets.

Where contamination is a factor, all conveyor designs should provide means for thorough yet convenient cleaning with water, air, steam, or other auxiliary methods.

Preventing corrosion of mechanical parts is an important consideration of the chemical industry. Appropriate types of stainless steel, Monel, and other alloys provide resistance for wearing parts and those working under stress, such as elevator and conveyor chains. Other parts may be plated or coated with less expensive non-corrosive materials, or actually made of them. Renewable rubber liners for troughs, chutes, and hoppers are sometimes desirable.

Shaft bearings should be located outside of conveyor housings and casings wherever possible. When they must be in the direct flow of material they may be protected with the better types of available shaft seals.

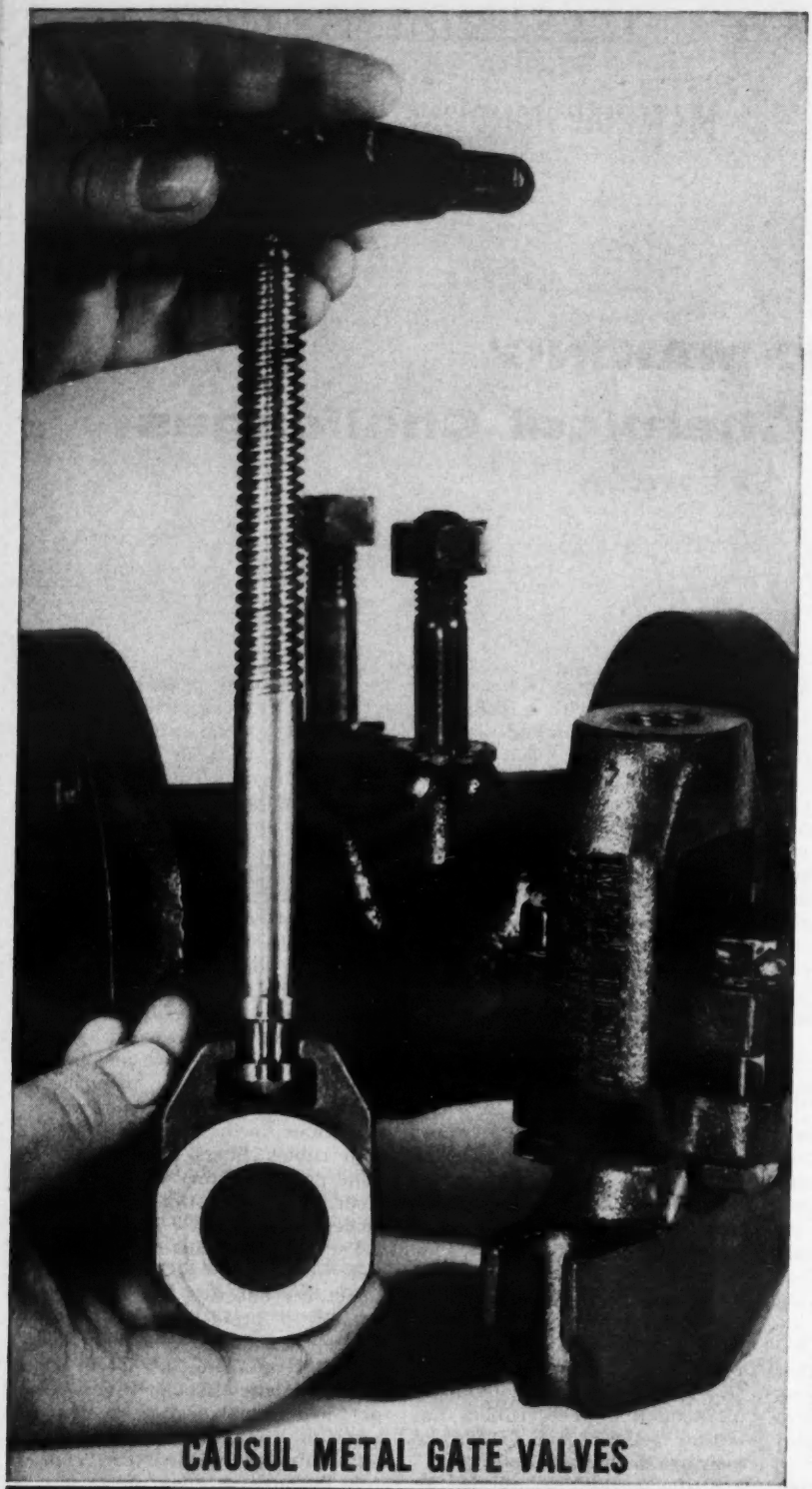
Some materials have a tendency to adhere to metal parts tenaciously. When metal conveyors are otherwise desirable, this difficulty can sometimes be avoided with metal surfaces that are highly polished. In other cases, it may be necessary to coat metals with special rubber compounds or with Teflon, providing such coatings will not abrade or spall off due to the abrasive action of material.

Other materials may cake and harden like concrete. Rubber tread belt idlers resist such action and the rims of pulleys are often lagged with resilient rubber, causing the hardened, adhering material to crack and fall off. Screw conveyor troughs, hoppers, and other containers are sometimes made of rubber or with rubber liners to serve the same purpose. Other troughs are made with drop bottoms for convenient cleaning.

For cleaning materials from conveyor belts, scrapers are sometimes effective, but there is usually a problem in keeping them free and in operation. Also, a more complete discharge of sluggish materials can often be obtained from troughed conveyors if the trough opening is made substantially longer than for free flowing materials.

Eliminating Dusts

Dust-tight construction of troughs and housings is necessary for "good housekeeping" and for the health and protection of personnel. The selection of conveyor type and



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design of housings depends upon the internal pressures to be contained and the extent to which the dust or fumes must be confined. But relatively slight modifications are required to provide highly effective enclosures of standard screw conveyor troughs, oscillating conveyor pans, and casings for elevators and drag conveyors. Other types of conveyors require more extensive housing designs for added protection against these hazards. Transfer chutes and hoppers must not only be tight but may require provision for relief of air when large volumes of materials are handled at high speeds.

Degradation of friable materials is best avoided by the use of conveyors that carry the material rather than slide or push it in troughs. When reasonable tolerances are permissible, slow speed, oversize conveyors are often effective in minimizing degradation. Transfer chutes should be eliminated wherever it is practical or economical to combine the functions of several conveyors or elevators into one unit of the carrying type. When chutes are required they should be designed to minimize impact and to reduce the abrading action of the material flow from one unit to another.

Probably the most difficult handling problems involve the removal from hoppers and bins, of materials that have a tendency to arch over outlet openings by packing or matting. Such materials may require bins with vertical sides, or sides that slope outwardly to provide bottom openings larger than the top. Usually, better recovery is obtained from circular bins. Wide feeders and amply sized outlet openings are usually needed for withdrawal of these materials dependably. For some, it may be necessary to provide for movement of material over the entire bottom of bin with such types of feeders as rotary plate, multiple screw, drag, apron, or belt. Electric vibrators, correctly installed, are effective for accelerating movement of material left in bin after major portion has been withdrawn.

Often, such problems are intensified by extreme varia-

tions of the same material which will flush when dry but arch over with addition of a few percentage points of moisture. In such cases, the free flowing material can be contained by extra long or inclined feeders, and the feed made uniform by means of short pitch screws, dam-type regulating gates, special housings, etc.

In the chemical processing industries, handling costs for bulk materials differ even more widely than do the characteristics of its materials and the nature of its problems. Industrywide yardsticks of cost are impractical in view of the wide variation in capacity requirements with respect to annual tonnages and the diversity of needs for special alloys, coatings, and enclosures. Generally, power is so low for mechanical conveyors that its cost is relatively unimportant in any over-all analysis of a problem.

Often, consideration of handling costs is of less importance than the benefits derived from conveyor systems, such as their adaptability to continuous processes, dependable performance, precise control of material flow, their high degree of automatic operation and freedom from attendance, safety and protection of health of personnel, good housekeeping, and generally lower cost of buildings. These benefits become more pronounced for chemicals of relatively high value since, with conveyor systems, there is less material in process, less spoilage and waste, and usually better quality control. These factors should be weighed heavily in appraising the effectiveness of existing handling methods and in the selection of new methods and equipment.

A broad background of experience is available in the conveyor industry and well equipped laboratories are maintained to determine the answers to the problems of handling bulk materials for which there is no previous experience. Thus, the right conveyor can be worked out systematically and often ingeniously to produce a successful installation — one that will handle the material dependably, safely, at low cost, in the quantity desired. ■

Why is it that the careers of so many men in business start off with a bang and end up with a whimper? What explains the gap between promise and performance?
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7 deadly reasons why so many business careers slow down so soon!
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Men are often lulled into complacency by routine promotions and small salary increases.
2 INCOMPLETE KNOWLEDGE OF BUSINESS METHODS
A successful executive must be familiar with every dept. of business — Marketing, Accounting, Production and Finance.
3 LACK OF SELF-CONFIDENCE
No man ever reaches the top unless he feels that he belongs there.
4 FEAR OF MAKING DECISIONS
It's impossible for anybody to attain success on a large scale until he learns the art of decision making.
5 INABILITY TO HANDLE MEN
Men who aren't able to lead others obviously can't go very far in business.
6 ABSORPTION WITH DETAILS
A man unable to delegate routine work allows himself to become bogged down by details.
7 LACK OF DEFINITE GOAL AND PROGRAM
Unless a man sets a definite goal for himself, he'll waste the most productive years of his business life.
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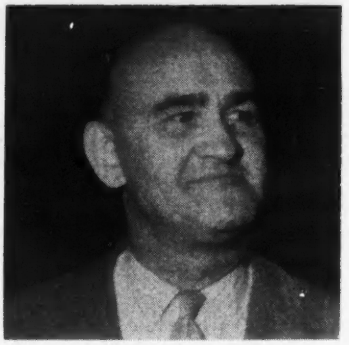
MATERIAL HANDLING in Chemical Processing

• BULK CONTAINERS

The Trend to Large Bulk Containers

CARL D. ACKERMAN
Tote System, Inc.



Carl Ackerman's experience in the material handling fields started when he joined the Peerless Bread Machinery Corp., manufacturers of bulk flour and sugar handling equipment, upon graduation from Case Institute of Technology with an electrical engineering degree in 1931. He joined the then young Tote System, Inc. of Beatrice, Neb., in 1949.

As more and more industrial producers realize that effective material handling results in increased productivity at decreased costs, material handling equipment manufacturers expect their market to increase over the $3-billion mark reached in 1957—a six-fold increase in a decade. A sizeable portion of the increase will be attributable to the growing chemical industries.

Since the revolution to bulk handling that began in World War II, when it was necessary for troops to move the most material with minimum manpower, more and more companies have participated in it with just about every major concern now using some form of bulk handling to reduce time and money expenditures.

One of the more popular forms that bulk handling has assumed in the past decade has been in the use of large bulk containers. These unit containers are available in several forms, each serving its own definite purpose.

First Metal Container

The first, practical, reusable metal bulk containers were introduced in 1948 by F. J. White, Sr. They are the now familiar Tote Bins. Available in aluminum, carbon steel, stainless steel, monel, or magnesium, they are in use in practically every industry—foods, cements, detergents, chemicals, phosphates, carbon black, drilling mud.

These units are hermetically sealed to prevent contamination of product. They can be tiered in storage to save warehouse space. From storage, they are employed singly or in groups for in-plant operations. Bins discharge through the bottom, and material can be carried away by screw, pneumatic, or any other standard conveying system.

Other more recently introduced reusable unit containers now being employed by the industry are collapsible rubber units available in four sizes. These units offer the advantage of shipping in bulk carload or truck-load quantities and returning the collapsed container to the supplier in either LCL or LTL shipment thereby conserving space on normal haul.

There are other containers that somewhat resemble Tote Bins but differ by the fact that they must be inverted for discharge and, because of their conical tops, cannot be tiered without modifications.

Large stationary bulk hoppers or silos are also coming into more widespread use, but these are practical only when the flexibility and adaptability of a material handling system are relatively unimportant. Therefore, their economical use is restricted, since plant capacity, layout, or product produced may change and make the stationary equipment obsolete and/or expensive to utilize.

Unit containers, on the other hand, which are considerably less expensive in initial cost and upkeep, offer approximately the same labor savings as do large bulk silos, plus flexibility, adaptability, and sanitation. Unit containers can be used for both intra- and inter-plant operations, acting as shipping containers, storage units, and discharge hoppers.

Solves Warehousing Problems

If a warehouse becomes crowded, hermetically sealed unit containers may be transferred out-of-doors. They are weather-, contamination-, and siftage-proof. Since they are so easily transported, plant layouts can be changed with ease. The containers may be used interchangeably for different products as the need arises. To expand, a company needs only to add a few containers. Furthermore, for multi-plant operations, unit containers may be exchanged or inventories shifted easily from one to another.

As transportation containers, they may be spout-filled at source of material and transported by a flatbed conveyance —most often by truck, but also by rail or barge, depending upon circumstances and facilities available to the receiver.

Upon arrival, the units are lifted off by fork truck or by crane and monorail and carried into storage to be used as desired.

For in-plant operations, unit containers provide a versatile and economical means to store and cure materials between manufacture and packaging or while awaiting the outcome of laboratory tests. Specifically in the case of lab analyses, hermetically sealed units assure that the product will retain its color, aroma, and all other inherent characteristics. ■

Starting on page 48 and distributed throughout the remainder of this feature on material handling, you will find case history stories telling how chemical processing companies have realized savings by employing modern material handling methods.

MATERIAL HANDLING in Chemical Processing

• PNEUMATIC CONVEYING

From plastics to soda ash,
from unloading to packaging . . .

A Versatile Tool for a Versatile Industry

HOWARD S. SAYRE
Manager, Special Projects
Fuller Company

Howard S. Sayre received his mechanical engineering degree from the University of Pittsburgh. He joined Fuller Company in 1935 and has held the posts of Chicago Office manager, director of Research and Development, and is now manager of Special Projects for the Sales Department. Previous to joining Fuller Company he was engaged in power plant work and devoted his efforts chiefly to the combustion of pulverized coal, blast furnace gas, coke oven gas, etc., while serving with Duquesne Light Company and Carnegie Steel Company of Pittsburgh and later in the district offices of Combustion Engineering Corporation.

In looking at the chemical industry, the pneumatic conveying industry finds one of the largest fields for its products while at the same time it sees a field that challenges the ingenuity and resourcefulness of the pneumatic conveying engineers to the utmost. Almost every installation presents its unique problem.

In addition to the usual problems of capacity and conveying distance, there are problems of corrosion, contamination, particle size degradation, discoloring of product, use of non-ferrous metals, special alloys, elimination of metal to metal contact, toxic materials and dusts, explosive dusts, hygroscopic and delequescent materials, abrasive materials, materials sensitive to heat and pressure, to name a few.

A prime example of this is in the rapidly growing plastics industry where pneumatic conveying is playing such an important role. In fact the production of many types of plastics, particularly where complicated blending operations are involved, would not be economically possible without pneumatic conveying equipment. Stainless steel and aluminum are preferred materials of construction and the limited amount of these metals required in pneumatic conveying systems compared to that required in other types of conveying equipment greatly reduces the cost of plant construction. Metal-to-metal contact between moving parts is undesirable and nylon and other synthetic materials must be used in construction.

Most of the plastic products are subject to damage by exposure to excessive heat and rubbing, and special consideration must be given in the design to avoid this damage. Frequently, different types of plastics must be conveyed in the same system and possibility of contamination must be avoided to insure the high quality of the product.

Another prime example in the chemical line is salt cake (Na_2SO_4), (both the primary and by-product materials) used by the pulp and paper industry at a rate considerably in excess of 10 million tons/year. This material has properties found in other chemicals to a greater or lesser degree and will serve as a good illustration.

The pneumatic conveying engineer looking at this product would consider it suitable for handling in a pneumatic system and, since it is normally transported in railroad cars, he would select a vacuum unloading system. He would normally expect the salt cake to have a pH value of 6.0 to 7.0 with a weight of approximately 80 lb/cu ft and a fineness of approximately 100% through the 20-mesh screen and approximately 50% thru the 100-mesh screen.

However, from experience he knows that the manufactured product will be free flowing and can be shipped in covered hopper cars while the by-product or synthetic type may not be free flowing and will be shipped in box cars. If it is determined that both manufactured and synthetic types of salt cake are to be handled, the pneumatic conveying engineer provides the proper nozzle for working in box cars, and the proper nozzle for attaching to covered hopper cars.

The entry of by-product or synthetic types of salt immediately presents new problems. The pH value of different synthetic salt cake varies between 3.2 and 9.1; the weight per cubic foot from 70 to 100 lb; and the fineness from extremely fine (pulverized) to coarse granular. Due to the presence of fine dust, a filter is required of the cloth tube type at the point of delivery or distribution, where the salt cake is separated from the air and the air used for conveying is returned to the atmosphere free of dust.

If the salt cake to be handled is always on the alkaline side, the use of economical cotton filter tubes would be recommended; in the handling of acid salt cake, Orlon filter tubes are recommended; and in the handling of both alkaline and the acid salt cake, Dynel tubes are recommended.

Another illustrative chemical which present a different type of picture to the pneumatic conveying equipment engineer is soda ash. Millions of tons of this chemical are produced each year and a large portion of this tonnage in the light form is handled in pneumatic conveying systems.

The nature of the material permits a certain amount of selection between the various types of pneumatic conveying equipment. The material can be fluidized to some degree, lending itself to the application of conventional solids pumps, specialized solids pumps, fluidizing or dense stream systems, and blow tanks, all falling in the category of pneumatic pressure systems. The designer is ever mindful of keeping particle size degradation to a minimum. However, the variation in particle size gradation makes it necessary to use a

volume of conveying air somewhat above the desired optimum.

Several producers of soda ash transport in ships and barges, as well as box cars and covered hopper cars. Here again the pneumatic suction unloading system with its flexibility and dust-free operation is employed. In many cases the conveying systems are required to handle more than one chemical product and on occasions lime must be handled as well as soda ash.

Cleanliness Important

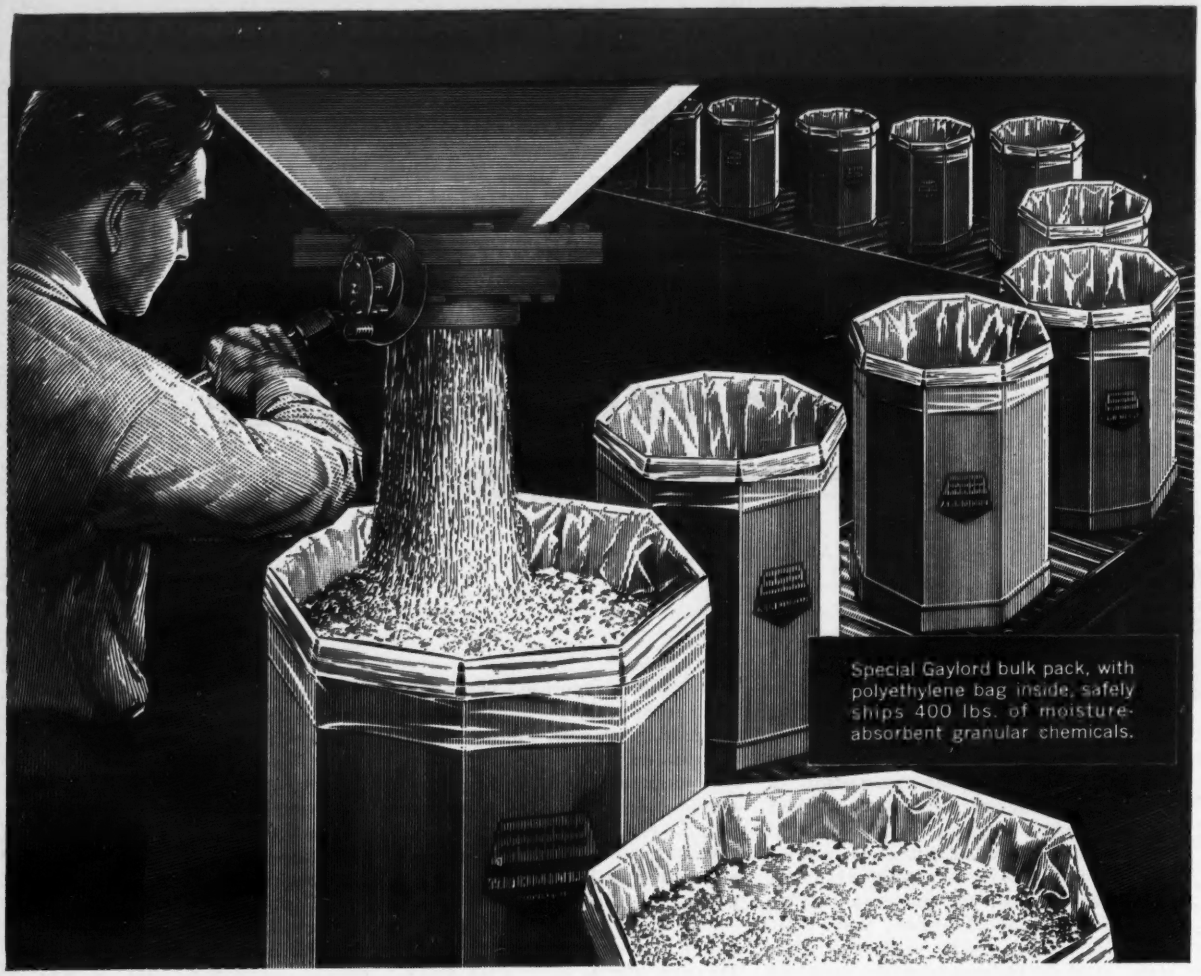
Here the cleanliness of the suction-type system is very important to protect the workmen from the irritating effect of caustic soda formed by the combination of the lime and soda ash dust.

In unloading barges or ships, where soda ash must usually be conveyed over considerable distances, a combination of the vacuum-pressure type system is generally used to take advantage of the flexibility and cleanliness of the vacuum system and the economy of the pressure system for conveying long distances.

Cellulose Acetate

Cellulose acetate can be conveyed safely in a pneumatic system without danger of propagation of an explosion or fire in the conveying lines or equipment. Where blending of stocks is required, pneumatic conveying permits remote control of the weighing and blending operation. Complete automation is employed and control panels with illuminated graphic flow lines provide the system operator a visual check on all operations.

To consider all the products and problems of an industry so broad as the chemical industry would be an endless task. However, the preceding discussion will serve to show the versatility of pneumatic conveying systems in handling materials from unloading, through processing, to packaging, or making bulk shipments. The pneumatic industry is prepared to serve the chemical industry with systems of highly specialized design employing modern materials, modern methods, and automation. ■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Division of Crown Zellerbach Corporation

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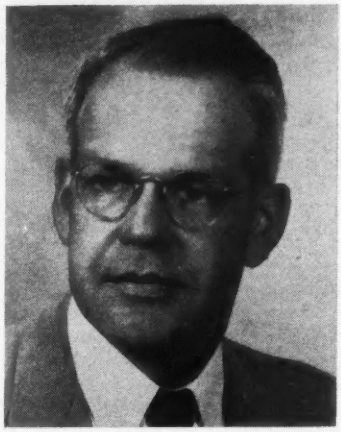
MATERIAL HANDLING in Chemical Processing

• BULK HANDLING BY VEHICLE

Moving Chemical Mountains

JAMES A. SUTER
Manager, Sales Engineering
The Frank G. Hough Co.



A practical engineer with wide experience in the field as a district representative for The Frank G. Hough Co., a sales manager for a distributor organization, and a sales engineer, James A. Suter now heads a new department for his company.

During World War II, he spent four years in the Corps of Engineers, two and one-half years of which were in Burma building air fields and working on the Ledo Road.

His development work in the field has brought him in contact with numerous chemical and fertilizer plants. He has worked with them on the development of new types of buckets, operational methods, and applications of attachments such as sweepers and back-rip scarifiers.

Each year, the chemical industry faces the tremendous task of moving millions of tons of bulk materials. In many instances, to do this job efficiently and economically, the tractor-shovel is used because of its mobility and flexibility.

Many of the process industries are dependent on either an erratic supply of raw materials or a seasonal demand for their products. For instance, in the fertilizer industry, the shipment of finished goods is seasonal. At peak periods, plants will probably work around the clock on a seven-day-week basis. In other industries, the arrival of large quantities of raw materials may be very erratic — anywhere from days to months may represent periods between shipments.

This little continuity in the flow of materials into or out of the plant calls for material handling equipment that is extremely flexible. Machines which can perform one job today, another tomorrow, and still a third on the following day will go a long way in solving such handling problems.

The industry has seen a major shift to bulk handling methods over the past few years. This change in handling procedures may have come about due to the company's efforts to cut handling costs in its operations. In other cases, it has been brought about by the customer's requests to receive the product in bulk, as he, himself, has changed to bulk handling in his plant. Perhaps, the raw material supplier has made available shipments in bulk.

More often, switching to bulk handling methods has had to be accomplished with minor changes in plant design or layout. In line with this, outdoor warehousing, where bulk materials are stored out-of-doors (generally, under temporary shelters), has become popular.

When these situations occur, tractor-shovels have played an important part in meeting the handling requirements by moving large quantities of materials quickly and economically.

As the demand for moving materials with a minimum cost per ton has grown, so have we seen major improvements in this type of equipment over the past few years.

Improved Bucket Designs

Today, a greater production capacity has resulted from improvements incorporated in the design of all units. A case in point is the cycle through which the bucket moves in its regular operation.

Originally the bucket was affixed to uprights, similar to those used on fork lift trucks. Later, the bucket was attached to boom-arms which gave a greater degree of "tip-back" to bucket and load, but necessitated carrying the load in a high position and further from the machine. This decreased the margin of safety in the operating cycle.

Compare this with today's units: In most cases, the bucket action permits a greater amount of "roll back" at ground level. In some instances the load is actually carried closer to the machine during carrying operation than in the digging position. The center of gravity for the whole unit is lower with a loaded bucket than with an empty one.

This change in bucket-action has the additional advantage in that the newer design enables the tractor-shovel to carry more material on each trip. Where earlier designs could be likened to carrying material on a spade, the current style is more like carrying the material in a pail. Consequently, the unit cost-per-ton of handling materials has decreased through increased productivity.

More Performance Per Ton

Basically, the power train concept of a tractor-shovel has not changed. The engine manufacturers have incorporated improvements in the design of their product. The clutch, in most cases, has been replaced by a torque converter.

The transmission has been subjected to a more radical change than any other single component. The early units used a gear box working under the automotive principle of operation. Today, many units have power-shifted transmission as standard equipment.

The final drives have taken advantage of such progress as using improved alloys in the drive shafts and gears or changing heat-treating techniques employed during the manufacture of these parts.

These improvements have resulted in faster operating cycles and this, combined with ability to carry bigger loads, has provided users with more productive units. ■

In their new plant at Hawthorne, N. J., Morningstar-Paisley, Inc., eliminates dust nuisance and hazards, minimizes possibilities of product contamination, and . . .*

BOOSTS STARCH, GUM PRODUCTION WITH PACKAGED SYSTEMS

EDWIN M. HILLARY
Vice President
Morningstar-Paisley, Inc.*

Four complete and separate handling systems were employed to give Morningstar-Paisley's new starch and gum plant at Hawthorne, N. J., consolidated production facilities with the following features:

- extreme versatility in handling a number of different products
- elimination of dust nuisance and hazard
- minimization of product contamination possibilities
- lower handling and operating costs
- stepped-up capacity.

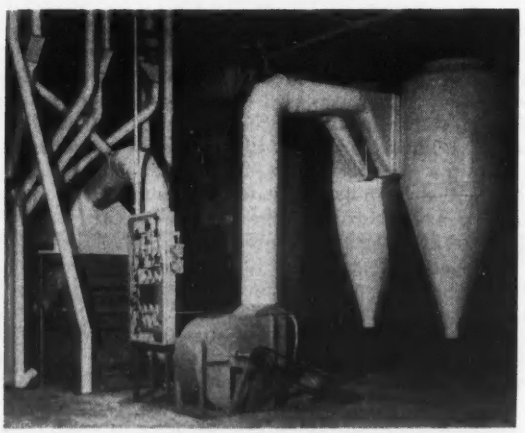
Packaged systems were incorporated in the blending and bagging of starch products, gum grinding (consisting of two identical systems), and gum granulation.

Blending and Bagging Starch Products

This operation is successfully handled by a combination of efficient, modern, unit machines, and a pneumatic conveying system. Essentially, it consists of:

Movement of Material

Heart of conveying equipment is a negative-pressure air system. In this, the fan is located on opposite side of collector from material-conveying line so that product does not pass through the fan.



Portion of gum granulating system showing air classification table, exhaust fan, and cyclones. This pneumatic unit is a completely closed-cycle system

No moving parts interrupt flow of materials, freeing the system from mechanical friction and minimizing wear. Since air conveying lines are under negative pressure and are sealed to maintain uniform air balance, exterior dusting is eliminated.

One system, 36-in in diameter, uses a 40-hp collector to handle discharge from three dump hoppers. System handles a 48-ft lift and a 26-ft run under even feed conditions without difficulty.

Secondary system (28-in diameter) conveys starch mix after it has passed through sifter. This 25-hp system tolerates a 48-ft lift and a 20-ft run under even feed conditions.

Discharge from mixers is collected by a 9-in screw conveyor and passed through a two-way valve back into pneumatic system of the starch process.

Bypass Mechanism

To insure versatility, conveying system is designed with series of bypasses, controlled by means of two-way air valves. This permits injection of material as received or, as an alternate, passage of it through various unit-machines and as precrushers and refiners.

Operator also has choice of flowing material into either of two horizontal mixers or to bypass mixers. Discharge from mixers is passed through sifters.

Combination of two systems with a series of two-way valves permits Morningstar-Paisley to mix and sift, or dump material from any one of three floors and bypass mixing equipment.

Removal of Tramp Material

Discharge from 40-hp conveying system is taken to a Gyro-Shaker designed to remove tramp material such as pieces of bags, strings, and even compacted oversize lumps. Unit combines gyratory and reciprocal motion resulting in sifting, separating and grading through relatively coarse screens.

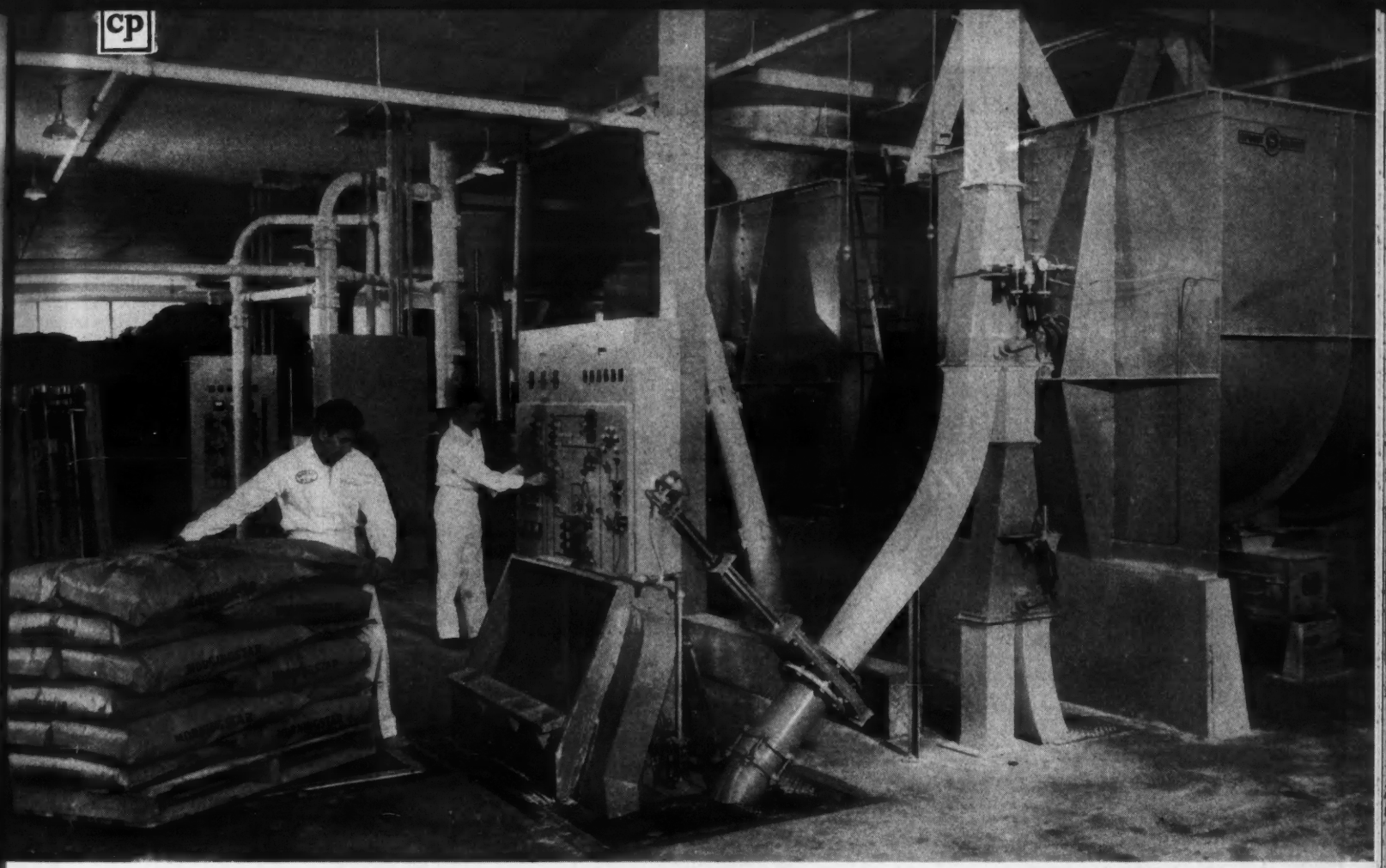
Crushing, Mixing, Sifting

A twelve-inch single roll crusher and twelve-inch grinding unit are used together to precrush minor ingredients before interjecting into system. Single roll crusher effects preliminary size reduction from 6-in ring size.

The twelve-inch Single Runner Attrition Mill is a single-rotating-disc unit widely used in Pulp and Paper industries. By careful selection of right plate styles, the unit becomes perfectly suited to Morningstar's purposes.

Horizontal Batch Mixers, designed to load, blend, and discharge with speed, are ideal for

* *On Jan. 1, 1958, Morningstar, Nicol, Inc. merged with its subsidiary, Paisley, Inc., to form a single corporation, Morningstar-Paisley, Inc.*



Morningstar-Paisley's new plant employs four separate systems — each consisting of a combination of pneumatic conveyors and unit machines — to handle blending and bagging of starch, gum grinding, and gum granulation

rapid intimate mixing of many types of starches. One-horsepower Gyro-Whip sifters can sift from 2 up to 325 mesh.

Storage, Packaging, Weighing

Packing bin with pressure bin indicators is located just over bagging scale. Bin is fed directly by the 25-hp collector located just overhead. Control discharge from packing bin to bagging scale continues pattern of automatic handling and assures accurate packaging.

Controls

Electrical controls for entire system are handled through control panel constructed with flow sheet on its face and designed to permit complete operation of system from this single location.

Gum Grinding and Blending Systems

These are two identical systems, used to grind various water soluble gums. Specifications in both systems call for reduction to various powders.

Gum is charged into system either by means of bucket elevator and dump sink on the first floor, or by means of bag dump on second floor. The material is then passed over the grading shoe designed to classify the product into +4, −4, +16, and −16 mesh.

The selected mesh is then passed to a Saw-tooth Crusher. Discharge is taken by a 28-in pneumatic system into another grader which is combined with an aspirating tip to remove bark, fuzz, etc. Bark and other tramp material is taken to bag filter and dropped to collecting drum on floor below.

This grader also has the function of separating gum into several particle sizes. (Marketing of this gum often requires different particle sizes and it is thus necessary to be able to classify the material at this stage and to keep it separate from then on throughout the system.)

Discharge from any of the bin compartments is taken by screw conveyor to a Double Head Attrition Mill. Discharge from this mill is taken to a sifter for size classification.

The product is conveyed through an air operated two-way valve into packaging section. As with starch system, this too is designed for complete versatility. It permits interjection of ingredients by means of a bag dump on the second floor, it permits drawing off various fractions from any number of selected points in system, it permits recirculation of fractions or even the entire mixer load. In addition, as with starch system, discharge from the fan is taken to a continuous automatic filter with filtrate again being taken back to the system for rehandling.

Gum Granulation System

The gum granulation system is very similar to grinding operation; however, the objective is somewhat different. Instead of seeking a finely pulverized gum, the attempt here is to secure a very closely sized granulated product. Therefore, basic principle of grinding is substantially different. Instead of grinding in a Double Runner Attrition Mill, size reduction is done in a Three Pair High Roller Mill.

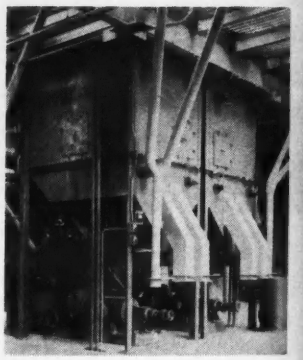
Material is injected through a first floor bag dump and is conveyed to the third floor by means of bucket elevator. After passing over a magnet to remove ferrous

metal contamination, material is classified. Residue is taken to a catch drum on bottom floor.

Classified material is either drawn off into a bag or it is passed to a saw-tooth crusher. At this point, material is dropped into a stock bin and then granulated. Discharge from this roller mill is picked up by a 20-in diameter, 7½-hp pneumatic system and brought back to top floor.

Discharge from this collector can go to sifter to be classified into five general particle size ranges.

Here again is where extreme versatility of the system comes into play. Oversized material is recycled to stock bin over roller mill. Selected material is taken out of system into a bagging or drum station on third floor.



Portion of gum grinding system showing bins and attrition mills plus pneumatic conveying lines. System is designed for complete versatility to meet varying market demands for different particle-size gums

Three in-range materials can be taken to stock bins on third floor or bypassed by means of three air operated two-way valves.

Main purpose of putting material into stock bins at this point is to provide feed stock for selectively cleaning and classifying on air tables located on second floor. If so desired, air table can be bypassed by two-way valves and thus stock bins' contents can

*Snap-tite

QUICK-CONNECT

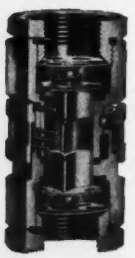
QUICK-DISCONNECT COUPLINGS

in larger sizes

immediate delivery

FROM FACTORY STOCKS

Snap-Tite's "H" Couplings are now factory-stocked for quick shipment to you, not only in the smaller sizes (below 1" ID) but in all sizes up to and including 3"—in steel, brass, aluminum, and 303 and 316 Stainless Steel. And "H" Couplings can be made to your order, up to 10" ID.



Available with valves to give two-way or one-way automatic line shut-off, or without valves for straight-thru flow, "H" Couplings are built to handle high pressures in hydraulic and air systems.

Recessed valve washers . . . fluted valve stems . . . valve stops with minimum flow restrictions . . . large inside diameter—allow maximum flow capacity with lowest pressure drop.

See the Snap-Tite representative in your city or write for Bulletin 240.

SNAP-TITE'S "H" COUPLING, SIZE FOR SIZE, IS THE SMALLEST COUPLING WITH HIGHEST STRENGTH AND HIGHER EFFICIENCY

*Snap-Tite, INC.

UNION CITY 6, PENNSYLVANIA

SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS

Check 3863 opposite last page

For more information on product at right, specify 3864 . . . see information request blank opposite last page.

Photo courtesy of The UPJOHN Company

Now! Snail's pace to top speed...no jars, no jolts!

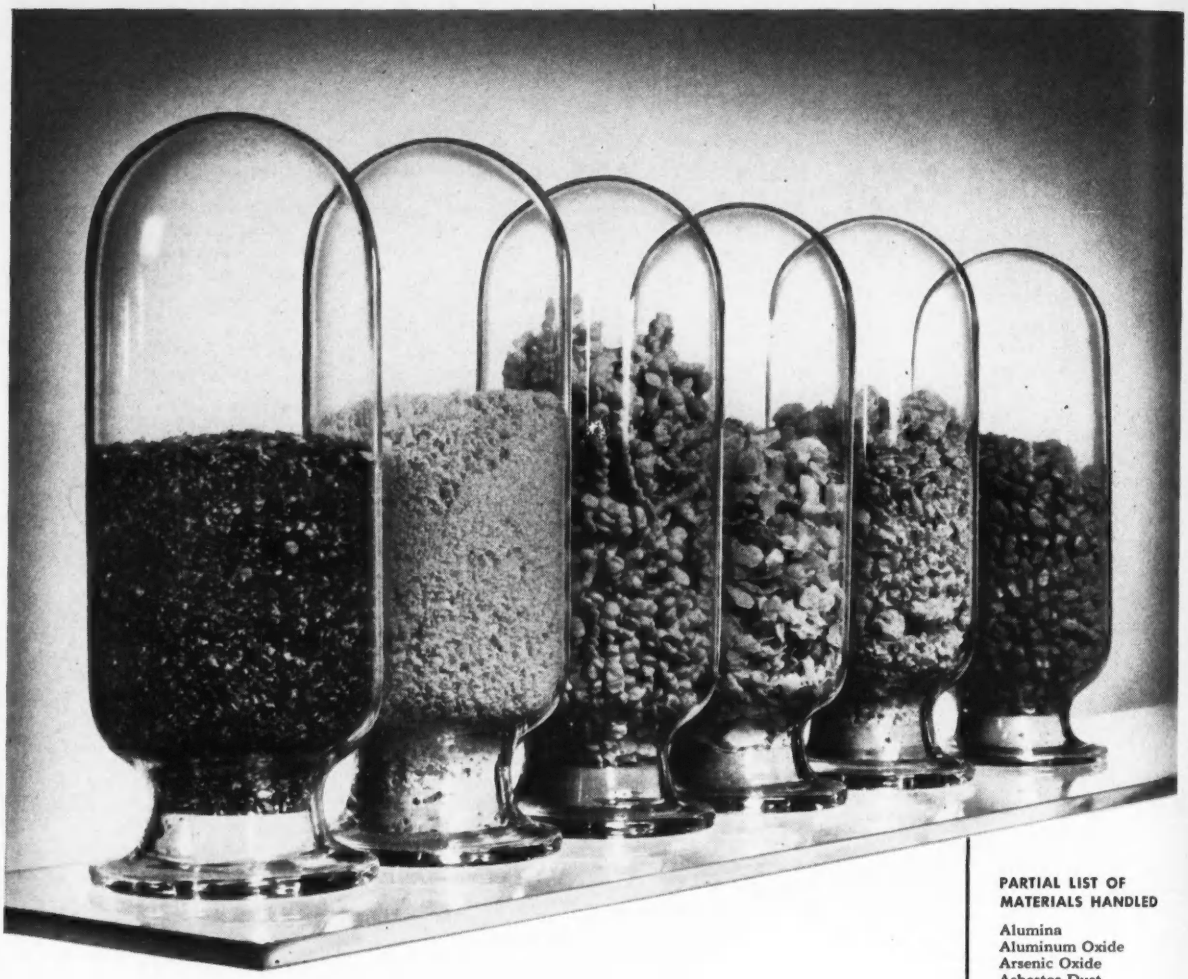
Entirely new! The only electric fork truck that provides smooth, "non-jerk" power-delivery under *all* working conditions.

On the all-new *Clarklift* Electric an infinitely variable speed control provides the *exact* torque necessary for different working conditions and assignments. On ramps, in congested areas, and particularly when inching or stacking . . . power is delivered with perfect regulation. Your driver has *complete* control of the travel speed of his truck at all times, resulting in greater efficiency and safety than ever before possible.

A new upright, one lever for both lift and tilt, self-adjusting brakes, unmatched accessibility are just some of the new features. There are many, many more. Send today for a brochure giving full details. Simply write: New Electrics, Clark Equipment Co., Battle Creek, Mich.

CLARK® EQUIPMENT

CLARKLIFT is a trademark of Clark Equipment Company



THESE MATERIALS FLOW THROUGH THE AIR

...with the greatest of ease

Today, more and more industrial plants are turning to Fuller to solve their problems in handling a wide range of dry bulk materials. Fuller pneumatic conveying systems have gained such wide acceptance within industry because Fuller has engineered its equipment for "automated" operation.

When you have a Fuller system, you can save thousands of dollars by buying in bulk rather than in bags. There is no waste in handling. The most stringent sanitation requirements can be met.

Efficient, peak production is assured and at far lower operating costs than many other types of conveying systems, and your maintenance problems are at the minimum. Why not write to Fuller Company today—we'll be glad to send you descriptive literature showing you how Fuller solves many different problems in many types of plants.

PARTIAL LIST OF MATERIALS HANDLED

Alumina
Aluminum Oxide
Arsenic Oxide
Asbestos Dust
Barite
Bauxite
Bentonite
Borax
Calcium Carbonate
Carbon Black
Catalysts, Petroleum
Cement, Portland
Cement Raw Material
Chalk
Clays
Coal, pulverized
Detergent Powders
Diatomaceous Earth
Feeds, soft
Fertilizers
Flour
Flue Dusts
Fly Ash
Gypsum (raw or calcined)
Lime, pulverized
Malt
Ores, pulverized
Phosphate Rock, pulverized
Resins, synthetic
Salt
Silica, pulverized
Starches
Sugars, refined
Talc

Fuller
. . . . pioneers in harnessing AIR

FULLER COMPANY
GENERAL AMERICAN

FULLER COMPANY
136 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Birmingham • Chicago • Kansas City • Los Angeles • San Francisco • Seattle

G-151
3756

Check 3865 opposite last page

be individually put over this air table or into any one of finish bins on first floor. Product from finish bins goes directly to bagging scale. An unusual aspect about the pneumatic unit in granulation system is that it differs from the other in being a completely closed-cycle system with return line.

(Complete system was engineered by, and all unit machines, such as sifters, grinders, crushers, mills, batch mixers, and conveyors, were manufactured by Sprout, Waldron & Co., Inc., Muncy, Pa.)

Check 3866 opposite last page.

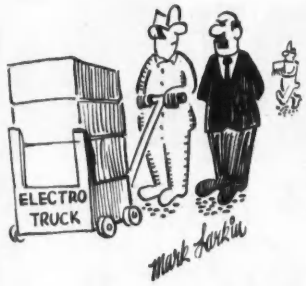
(Bagging scales were manufactured by Richardson Scale Co., Clifton, N. J.)

Check 3867 opposite last page.

Conveying system detailed

Manufacturer's bulletin illustrates and describes various apron conveying systems, including a hinged steel type for automatic removal of chips, turnings, and other scrap from high-production machinery. "A-F Apron Conveying Systems" — Alvey-Ferguson Company, 2228 Disney St., Cincinnati 9, Ohio.

Check 3868 opposite last page.



"Couldn't we get along without 'mush, mush'?"

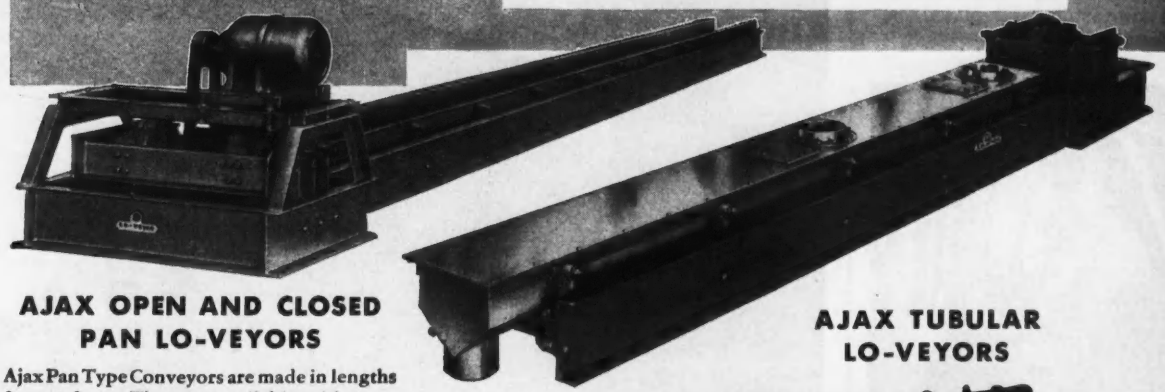
AJAX®

LO-VEYORS

VIBRATING TYPE

Combine Sanitation, Large Capacity, Adaptability, Low Power and Maintenance Costs

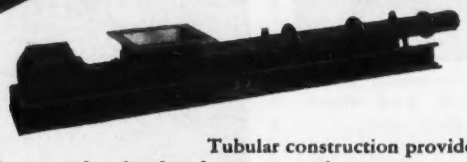
FOR MULTI-PURPOSE HANDLING AND PROCESSING OF BULK MATERIALS



AJAX OPEN AND CLOSED PAN LO-VEYORS

Ajax Pan Type Conveyors are made in lengths from 3 ft. up. They are available with open pan, or booted covers to safeguard critical processes or formulas against contamination. Conveyor pans can be arranged for simultaneous screening, washing, drying, cooling and other operations.

AJAX TUBULAR LO-VEYORS



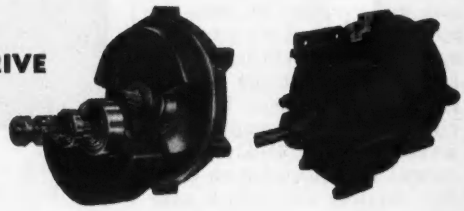
Tubular construction provides sealed, gas tight operation in closed systems under vacuum or pressure. Diaphragm seals can be used where tube passes through walls of processing plants.

AJAX SCREENS

Ajax Screens meet the ever closer limits of standardization in graded materials. They provide accurate separation, high capacities, minimum floor space, long cloth life and low power costs.

AJAX RECIPROCATING DRIVE

The secret of the performance of AJAX Lo-Veyors begins with this fully enclosed drive unit which generates a reciprocating straight line motion.



AJAX PACKERS

Ajax Packers are used for compacting bulk materials into bags, cartons, boxes and drums. Self-contained and easily integrated in production lines.

AJAX VIBRATING LO-VEYORS ARE SELF-CONTAINED

Ajax Vibrating Lo-Veyors are self-contained and require little headroom for drive and pan. They are easily and quickly installed on or below floor levels, or suspended from walls or ceilings.

Stringy, elongated, abrasive, fine or coarse mesh materials never hang up while being conveyed in Ajax Vibrating Conveyors. The positive upward and forward tossing action keeps materials flowing freely and evenly.

Made in a wide range of sizes and lengths, they are being used from beginning to end in progressive chemical processing. *Write for Bulletin 39.*

AJAX FLEXIBLE COUPLING CO. INC.

Representatives in Principal Cities **WESTFIELD, N. Y.**

Check 3869 opposite last page

Transistor 2-way radio gives lift truck driver lots of elbow room

Uses: Communicating with lift truck drivers via two-way radios.

Features: Compact "radiophones" easily mount on lift trucks and leave drivers plenty of elbow room. This miniaturization of units has been accomplished by extensive use of transistors and plated circuitry.

Compact size of mobile 2-way radios gives lift truck driver plenty elbow room

Transistorization has also licked battery drain problem. With transistors in all the IF and audio stages as well as power supply of this equipment, battery drain is held as low as one-eighth the current previously consumed by mobile radios. For example, with a system in the 24-42v range, normal operation for an 8-hr day requires less than 6 amp hrs.

Description: Radiophones are available in models for all battery voltages found on industrial vehicles from 6v on up. There is also a 117v AC model.

Provision has been made for varying power supplies, such as is found when voltage decreases throughout the day as supply is depleted. These radios are equipped with a transistorized voltage regulator that transforms primary power voltage down to a stable input, compensating for voltage fluctuations and drops.

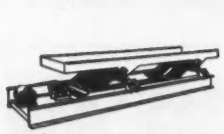
All mobile units come in two designs. One is completely self-contained for installation

FOR PRODUCT PROTECTION -

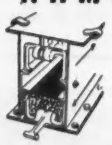
Bulk material is handled by these compact REDLER units, serving two production lines. Since their installation, production has been boosted three times over.

STEPHENS-

THE BIG NAME IN BULK MATERIALS HANDLING



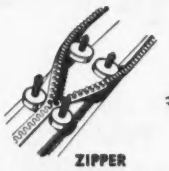
VIBRATING CONVEYORS



REDLER CONVEYORS, ELEVATORS

BIN GATES-ALL KINDS

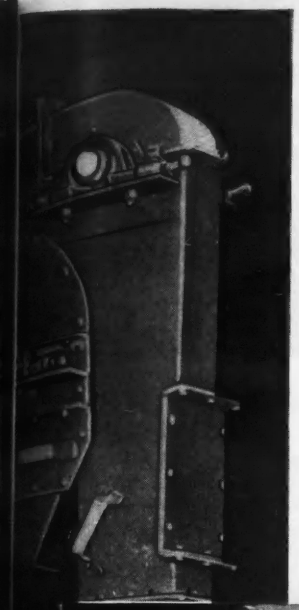
BELT CONVEYORS



ZIPPER CONVEYOR-ELEVATORS

VIBRATING SCREENS

your best bulk materials handling move

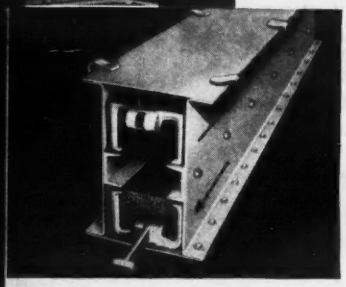


REDLER*

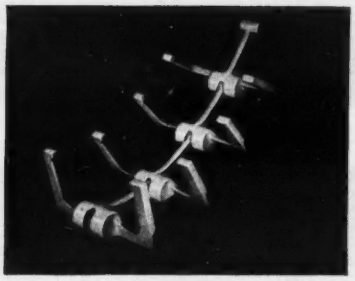
CONVEYORS-ELEVATORS

The REDLER Conveyor-Elevator is one of the most remarkable bulk materials handling machines ever built. It will move practically any pulverized, granular, small lump, or flaky material around corners, over vertical, inclined, or horizontal planes. Material moves forward in a compact column within a totally enclosed, dust-tight casing which virtually eliminates explosion hazards. Material is moved by means of closely spaced skeleton type flights linked together and moving through the casings. Material flows forward in a compact column. A very useful feature of the REDLER Conveyor, is its ability to discharge material at multiple points. When arranged as a horizontal closed-circuit unit, the REDLER Conveyor will re-circulate materials and is often used in packaging or distributing operations.

Compact REDLER Conveyor-Elevator designs are available in sizes to handle almost any tonnage. They are quickly and economically installed and their rigid box-girder-like casings are practically self-supporting. For complete data on REDLER Conveyors and Elevators, write for catalog 556.

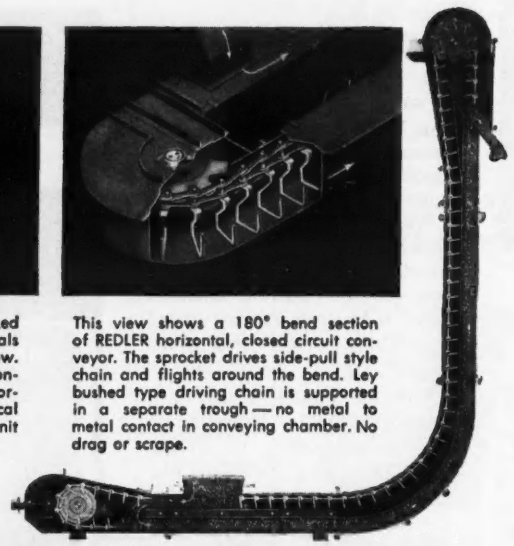


Cross section thru the REDLER conveyor casing shows material being conveyed in a lower run and the empty flights returning in upper run to complete the circuit. The casing is completely dust-tight, is largely self-supporting and requires very little space. REDLER units are self-cleaning.



Exclusive, skeleton type flights, linked together, are used to move materials forward in a steady, non-agitated flow. REDLER flights, linked together in continuous chain, readily curve around corners permitting horizontal and vertical movement of materials with one unit and one drive.

This view shows a 180° bend section of REDLER horizontal, closed circuit conveyor. The sprocket drives side-pull style chain and flights around the bend. Ley bushed type driving chain is supported in a separate trough — no metal to metal contact in conveying chamber. No drag or scrape.



*The REDLER conveyor is an exclusive Stephens-Adamson product.

-ADAMSON

EQUIPMENT

S-A district or main plant offices can supply complete information on any conveyor product, or any phase of bulk material handling. Call or write for a copy of REDLER catalog 556 for your file.

S-A

STEPHENS-ADAMSON MFG. CO.

MFG. CO.

MAIN OFFICE AND PLANT
11 RIDGEWAY AVENUE
AURORA • ILLINOIS

PLANTS LOCATED IN: LOS ANGELES, CALIFORNIA
CLARKSDALE, MISSISSIPPI • BELLEVILLE, ONTARIO

Check 3870 opposite last page

in a single mounting location near operator. Other separates radio set from speaker, microphone and controls for installations where space considerations dictate separate mounting of the two units.

Units are engineered to provide enough speaker volume to overcome ambient industrial noises. Models powered by 12v and up have a 5-watt audio output, while 6v units produce 3 watts.

Designed for rough handling, units are provided with a shock mounting, rubber cushioned bracket, or welded, heavy gage steel construction. Unit can be mounted horizontally, vertically, or on roofs of overhead crane cabs. Weatherized construction provides outdoor protection.

("Dispatcher" radiophones are manufactured by Communications and Electronics Div., Motorola Inc., 4501 W. Augusta Blvd., Chicago 51, Ill.)

Check 3871 opposite last page.

Walkie-type fork stacker . . .

. . . has high lift — 135" with 83" uprights — and is available in lifting capacities of 2000, 2500, and 3000 lb. Each model has backward tilt of 18 degrees giving loads greater stability in transit. Forward tilts are 3 degrees.

Units are designed for minimum right-angle aisle operations and are equipped with 36" forks. Quickly removable drive wheel and automatic lubrication of all powerhead parts insure simple maintenance. "Walkie-stacker" is product of Automatic Transportation Co., 149 W. 87th St., Chicago 20, Ill.

Check 3872 opposite last page.

Describes barrel lift

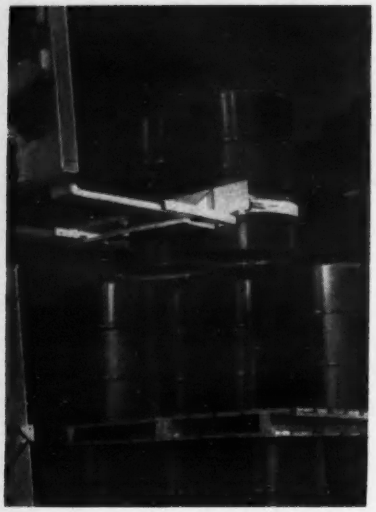
Descriptive sheet covers equipment for raising, transporting, rotating, tilting, and draining 55-gal steel drum. Bul 6-57 — Morse Mfg. Co., Inc., E. Syracuse, N.Y.

Check 3873 opposite last page.

KUGHLER

Vert-O-Matic V2F

DRUM, KEG AND BARREL ATTACHMENT



Vert-O-Matic V2F

costs so little . . . does so much . . . and does it fast!

If you handle drums—steadily or intermittently—there is a Kughler attachment that will do the job for you. These simple mechanical and automatic devices handle one or two drums, vertically or horizontally, or will manipulate them either way then serve as forks to handle pallets. Attach to truck apron or slip on forks. They cost much less than hydraulic devices, require no service or maintenance and are safe. If you want to cut your handling costs, eliminate the back-breaking work of manhandling and reduce personal injuries to workmen, contact your local lift truck dealer—or write, wire or phone us direct.

LG

LITTLE GIANT
PRODUCTS, INC.
1530-50 NE Adams St.
Peoria 3, Illinois

Manufacturers of quality products since 1918.

Check 3874 opposite last page

MATERIAL HANDLING

Mobile vehicle scale requires no pit

Uses: Weighing vehicles for load weight determinations in locations where temporary weighing stations are desired.

Features: Mobile vehicle scales require no pit, which permits them to be relocated as the job requires.

Mobile vehicle scales require no pit, which permits them to be relocated as job requires

Description: Units in capacities to 70 tons and lengths to 60 ft are available. Additional scale sections can be joined for greater length and capacity — this operation requires only 9 standard bolts.

Wide selection of weight indications is available — standard beam, recording beam, Dial Weightograph, remote dial, and many others including weight recording devices.

("Portable Vehicle Scales" are manufactured by Howe Scale Co., a subsidiary of Safety Industries, Inc., Rutland, Vt.)

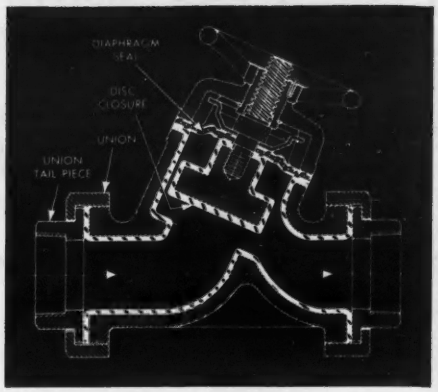
Check 3875 opposite last page.

Aluminum belt conveyor speeds foam-rubber cushion manufacture

At Firestone plant, conveyor carries material through oven

Installation of a belt-conveyor, whose belt consists of aluminum alloy "links", has enabled Firestone Tire and Rubber Co.'s Fall River, Mass., plant to speed up production of foam rubber seat cushions. In the operation, various formations of foam rubber are started at one end of the conveyor, which is 60′ long and

3 BIG ADVANTAGES in ROCKWELL "D—D" DIAPHRAGM VALVE



1 DIAPHRAGM FOR POSITIVE SEAL, fully supported, longer wearing. No packing gland to leak.

2 DISC FOR POSITIVE CLOSURE absorbs action and pressure of fluid; valve can be closed tight even if diaphragm fails; requires lower closing torque.

3 UNION ENDS ideal where replacement or inspection must be frequent. Saves on companion flanges, gaskets, bolts, alignment, labor, etc.

as well as

Oversized ports—high capacity; lower handwheel torque and fewer turns to close; lower thrust for automatic operation; body of any metal or lined with rubber or plastics.

Write for Bulletin 800.

W. S. ROCKWELL COMPANY
2208 ELIOT STREET • FAIRFIELD, CONN.
Sales Representatives in Principal Cities

Check 3876 opposite last page

RIETZ
ADVANCED EQUIPMENT FOR

SIZE REDUCTION

DISINTEGRATORS
PREBREAKERS
for
Pulverizing
Crushing
Disintegrating
Cutting
Homogenizing
Delumping
Fiberizing
Shredding
of
Fine or Coarse
Wet or Dry
Solids and/or Liquids

MIXING

DISINTEGRATORS
for Continuous Mixing and Blending of Solids with Solids; for Suspending and Dispersing Solids in Liquids.

EXTRUCTORS
for Continuous Mixing of Solids and Liquids to produce Heavy Pastes or Plastic Masses.

THERMASCREWS
for Batch Blending of Solids with Liquids with simultaneous Heating or Cooling.

HEAT EXCHANGE

THERMASCREWS
for Cooling of Dry Solids from High Temperatures *(above 1000° F)*; utilizing Minimum Space; eliminating Dust Losses; for a wide range of special Heat Exchange applications—Heating, Drying, promoting Chemical Reactions, etc.

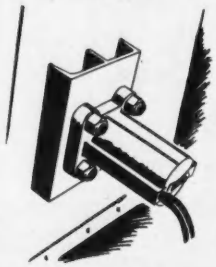
LABORATORY FACILITIES ARE AVAILABLE TO THE Chemical Industry at both Santa Rosa, Calif., and West Chester, Penn., for the testing of your product with Rietz Equipment on all of these unit operations.

Send for new Rietz "Engineering Report on Mixing"

Rietz
MANUFACTURING CO.
Santa Rosa, Calif. • West Chester, Penna.

Check 3877 opposite last page

Shake Loose
those bin problems with a CLEVELAND VIBRATOR



Maintain a regulated flow from your bins. Cleveland Vibrators eliminate plugging and jamming. Low in cost and easy to install, there is no bin damage and no wasted man hours.

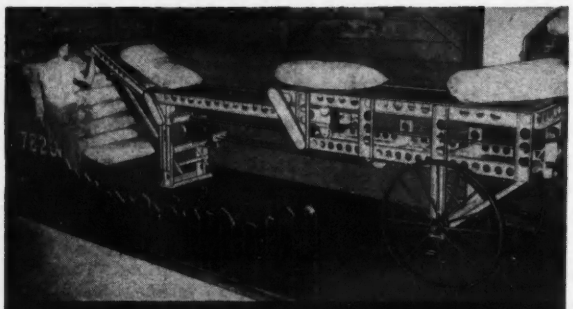
Write today for literature on air and electrically operated vibrators.

THE CLEVELAND VIBRATOR CO.

Dept. C3A,
2828 Clinton Ave. • Cleveland 13, Ohio

See our advertisement in the Chemical Engineering Catalog

Check 3878 opposite last page



SAVE UP TO 75% OF LOADING COST WITH *NEW IMPROVED . . .*

SACK LOADER

Now with one man doing the work of six both time and money are saved by the elimination of trucking, carrying and lifting. You'll save up to 75% of loading cost with our new loader. One of our customers says: "Your loader is very satisfactory and we are very much pleased."

Let us discuss your needs with you.

Ottumwa

BOX CAR LOADER COMPANY
OTTUMWA, IOWA

Check 3879 opposite last page

44" wide. These pieces are combined together in a cementing operation for a distance of about 30'.

The pieces then enter an infrared drying tunnel where the adhesive is cured at a preestablished rate.

Belt has variable speed drive of 8 to 20' per min.

Aluminum alloy belt-conveyor carries foam-rubber cushions through adhesive-curing ovens to inspection and packaging area

Operations have pre-determined proper speed for curing cycle.

Finished product then emerges onto a section approximately 10' long from where it is transferred to inspection and packaging area.

The loading and operating section is long enough so that all operations are completed before it enters the infrared drying tunnel.

Now, there is no time delay along the production line and a great number of seconds have been eliminated because the automatic drying operation prevents "smooching" of adhesives.

(Armorbelt conveyor is product of M-H Standard Co., 513-521 Communipaw Ave., Jersey City 4, New Jersey.)

Check 3880 opposite last page.

Describes sling chains

Capabilities and properties of manufacturer's sling chains are described in four-page bulletin. Chart provides working load limits of two-leg chains. Bul DH-101 — American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport 2, Conn.

Check 3881 opposite last page.

COST US NOTHING!!

READ HOW MAGLINER MOBILE LOADING RAMP PAID FOR ITSELF IN JUST 4 MONTHS

PROBLEM—*A ground level plant, Millington Mfg. Co., Upper Sandusky, Ohio. Lack of dock facilities necessitated costly hand loading and prevented efficient in-plant material handling.*

SOLUTION—Incoming shipments are now unloaded by power trucks using a Magliner magnesium Mobile Loading Ramp. One man unloads a 20,000 lb. shipment in 20 minutes that formerly took 12 to 16 manhours. Company now receives materials in 1,000 lb. containers (formerly 50 lb. bags)—effecting extra savings in processing and feeding presses. In the words of the manufacturer, "Our Magliner paid for itself in 4 months." *Actually, cost us nothing!*

Do you have an older building . . need extra or movable dock facilities . . want to avoid costly hand loading? A Magliner Mobile Loading Ramp is the practical solution. A loading dock on wheels, where you want it . when you want it! One man moves it.

Write for Bulletin DB-211
MAGLINE INC., P.O. Box 453
PINCONNING, MICHIGAN

MagLiner MAGNESIUM
Mobile Loading Ramps

Canadian Factory Magline of Canada, Ltd., Renfrew, Ontario

Check 3882 opposite last page

HOW OXY-CATALYST SYSTEMS STOP INDUSTRIAL AIR POLLUTION— RECOVER WASTE HEAT

New brochure gives facts and figures on typical installations—send for your free copy now!

Oxy-Catalyst Systems for air pollution control and waste heat recovery are one of the most important and most effective solutions to these problems ever developed. Engineered to your individual requirements, they can clean up close to 100% of combustible pollutants and odors. They can also recover the waste heat in process exhaust gases; and they can often do both at once.

This new brochure tells how Oxy-Catalyst installations have stopped air pollution—often at an actual saving—in a wide range of industries. If air pollution is a problem in *your* operations, write for your free copy now.

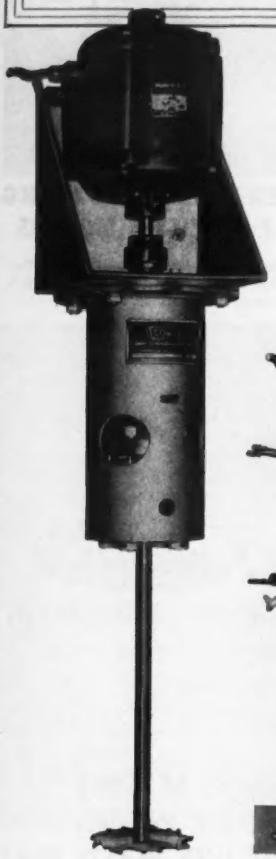
OXY-CATALYST, INC. WAYNE 7, PA., U.S.A.
Catalysts for fume and odor elimination, air pollution control, and waste heat recovery

Please send me your new brochure on Oxy-Catalyst Systems for air pollution control and waste heat recovery.

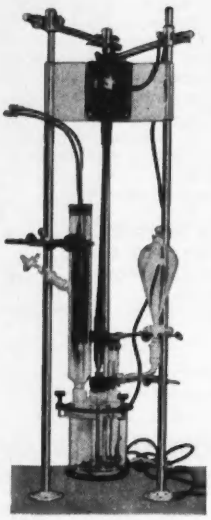
Name_____
Firm_____
Street_____
City_____ Zone_____ State_____

Check 3883 opposite last page

FOR EXOTIC FUELS...



Cowles Pilot-Plant Sodium Dispersion Dissolver



Cowles Laboratory Sodium Dispersion Dissolver

Metallic dispersions finished in 30 minutes or less, particle size as small as two microns, with Cowles Dissolvers.

Largest Manufacturers have selected Cowles equipment

Highest quality metallic dispersions can now be easily controlled and produced in big volume, making many reactions commercially practical for the first time.

Key to the new method is the unique action of the patented Cowles impeller. With rim speeds of up to 6150 fpm, the impeller vanes create a zone of intense turbulence and hydraulic shear. The liquid is moved rapidly through itself until maximum dispersion is obtained. The Cowles thus gives several many very important advantages:

Versatility — prepares material for many reactions under conditions not heretofore possible.

Finer particle size — gives maximum reaction surface to dispersed elements.

More complete dispersion — assures complete homogeneity of material.

Greater speed — cuts finished dispersion time substantially.

Cleanliness — self-cleaning impeller will not clog with metal.

Safety — gives the close control necessary with highly active materials.

Predictable results — laboratory and pilot-plant models provide results easily duplicated in larger models.

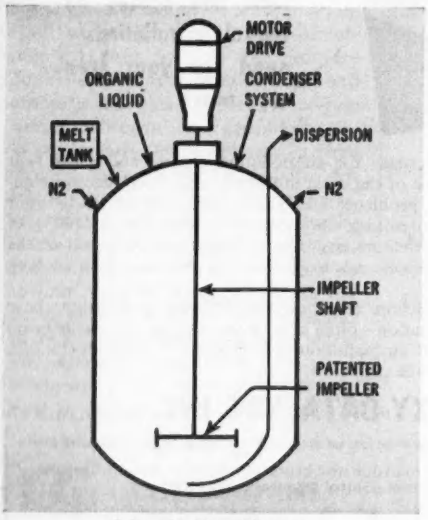
New Cowles Dissolvers with properly sealed and specially designed drives for metallic dispersions are available for all purposes. Included are "package" models in both laboratory and pilot plant types, and models for commercial production. All are thoroughly proven in actual plant operations and represent the broad experience and know-how of our organization – the established leader in its field. Specialized engineering assistance can be supplied if desired.

For complete information write today for Technical Bulletin No. 21-1957, "Metallic Dispersions with the Cowles Dissolver."

Additional Cowles Dissolver models are available for efficient processing of all solid-liquid, liquid-liquid and gas-liquid products.

Take advantage of the unusual *Morehouse-Cowles Processing Equipment Application Service* at no obligation – for a comprehensive survey of your plant requirements and end products, with laboratory assistance and in-plant tests at our risk.

See us in Booth 423, Pacific Chemical Exposition, San Francisco April 13-17 5702-R



Schematic Plant Diagram

For complete information write, wire or phone—

MOREHOUSE® COWLES®

MOREHOUSE-COWLES, INC.

1150 San Fernando Rd.
Los Angeles 65, Calif.
Telephone CApital 5-1571

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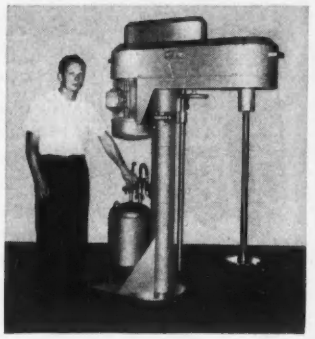
Convenient lease and time-payment plans • Distributors in principal cities

(Advertisement)

TWO NEW BIG-VOLUME MIXERS ADDED TO COWLES DISSOLVER LINE

All models efficient for processing wide variety of chemical and similar products



Now Cowles Dissolver models cover a wider volume range than ever, from small laboratory types to the most powerful units on the market.

The new large capacity mixer, Model 510VHV, is designed to bring variable speed to big batch mixing. It enables operation at optimum speeds from 900 to 2100 rpm on a wide variety of products. Unit is powered by a 7-½ or 10 H.P. motor.

Largest-capacity lift-type mixer yet developed is the new model 720VH. Requiring only relatively small space it makes possible the application of 20 to 40 H.P. motors for big volume and high viscosity batches at 900 to 1500 rpm.

Great versatility of all models is outstanding. They are highly efficient for fast ultimate dispersions in the manufacturing of industrial chemicals, drugs, medicines, pharmaceuticals, cosmetics, cleaning and polishing preparations, waxes, paints, varnishes, lacquers, enamels, fertilizers, insecticides and similar products.

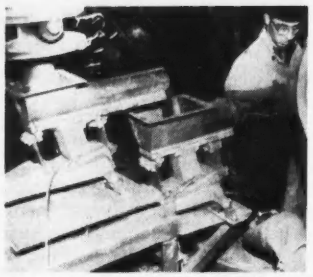
In-plant tests without obligation to buy are offered established firms to provide greater volume at less cost and improved quality. Complete application and engineering assistance for most efficient plant arrangement and operation are also offered.

For complete information about your particular needs address Morehouse-Cowles, Inc., 1150 San Fernando Road, Los Angeles 65, California.

Check 3884 opposite last page

Slick triple play combo with vibratory feeders

Novel and ingenious method of material handling has been developed at Glidden Company's Chemicals, Pigment & Metals Division, Hammond, Indiana, by hooking up a pair of vibratory feeders in tandem to perform multiple operations. The result is an automatically controlled combination of feeding, screening and weighing that provides faster and far more accurate operation than was possible before the imaginative team-up of the feeders.



Creative use of vibratory feeders pays off three ways

In operation of triple play device, unit 1 feeds lead powder from an overhead hopper, at controlled rate, to unit 2 which is equipped with sealed-in tubular screen. Second unit agitates constantly at top speed to insure uniformity of lead particles. Both units are interlocked with an automatic scale so that they feed at maximum rate until nearing a pre-set amount, then cut back to a dribble and shut off as material in pail reaches exact required weight.

(HI-VI vibratory feeder is product of Eriez Mfg. Co., Erie, Pa.)

Check 3885 opposite last page.

Tractor maintenance

Preventive and operational maintenance of crawler-type tractor parts are featured in six-page bulletin. Rexarc form 757 — The Sight Feed Generator Company, 38 E. Third St., W. Alexandria, O.

Check 3886 opposite last page.

NOTHING BUT A BELT CONVEYOR
achieves such a low cost per ton for transportation on jobs like this. It works continuously—without loading or unloading delays . . . with no loss of time for empty return trips. Further economies result from low operating expense, based on cost per ton handled.
...AND NO ONE BUT LINK-BELT
offers such complete service for engineering belt conveyors. Calling on unequalled depth of experience, Link-Belt can do a quick but thorough job of analyzing your requirements . . . back up recommendations with a complete line of equipment.
OVERALL ENGINEERING
COMPLETE EQUIPMENT
SKILLED ERECTION
ASSURED SATISFACTORY PERFORMANCE

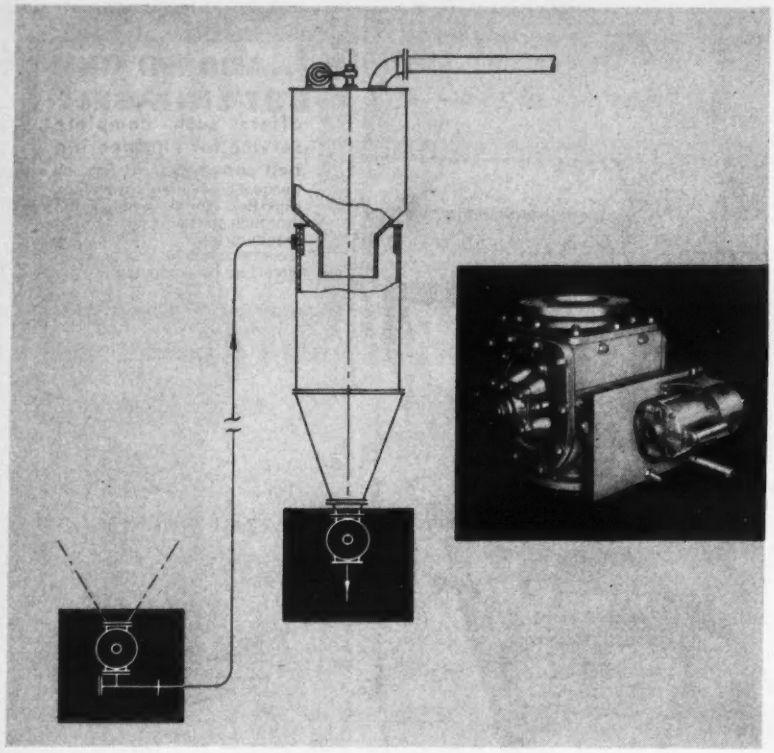
No wasting of engineering manhours on details . . . no need to exchange drawings with scattered suppliers with Link-Belt handling your belt conveyor installation. You get all equipment from one source . . . the specialization that only industry's most comprehensive line of idlers—plus pulleys, drives, terminal machinery and auxiliary equipment—can offer. From design through erection, Link-Belt takes on total responsibility. Our nearest office has full information. 14.709

LINK-BELT

BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.

Check 3887 opposite last page



Put This ROTARY FEEDER in Your System and End Production Headaches

Are you experiencing the *usual* headaches connected with the *usual* rotary feeder installation? Problems like . . .

- Irregular feed
- Flooding during feeding
- Leakage of feed, due to wear
- High maintenance costs
- Difficult and costly installation

Solving these problems is easy—just *specify an A-S-H Type "B" Rotary Feeder.*

The A-S-H Type "B" Rotary Feeder was engineered to meet your needs. Our exclusive rotor and shoe design guarantees positive feed without flooding, adjusts easily for wear and can be replaced without dismantling piping. Data Sheet DVc shows how this is done, and how the Type "B" will solve other rotary feeder headaches. Send for your copy today.

the **Allen-Sherman-Hoff** company

257 E. Lancaster Ave., Wynnewood, Pa.

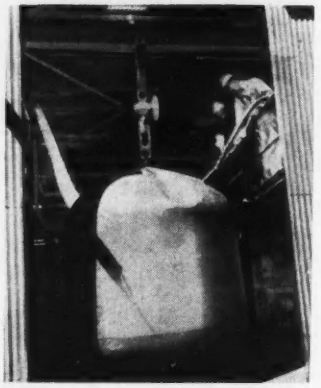
Offices and representatives in principal cities

MATERIALS HANDLING EQUIPMENT

Check 3888 opposite last page

A trend in full swing

Modern material handling and shipping methods play a big part in the manufacture of a modern metal, zirconinum

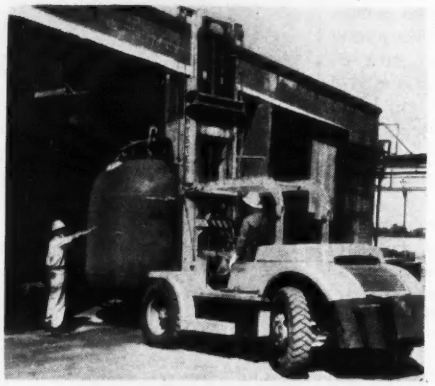


Operators load zirconium tetrachloride into collapsible, lined, rubber containers at Stauffer Chemical Co.'s Niagara Falls plant. Each container holds 10,000 lb. Because zirconium tetrachloride is reactive, it is blanketed with an atmosphere of nitrogen

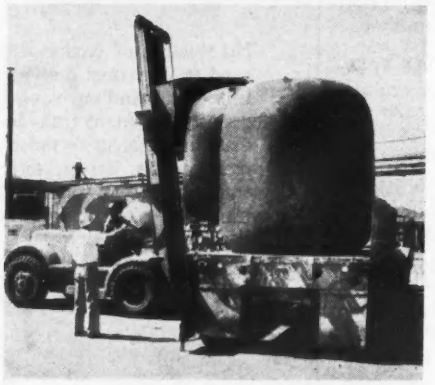
About the most outstanding developments in the ever-changing chemical processing scene are the continuing shifts to handling and shipping in bulk lots. This trend has taken on many new faces, with various types of liquid and solid handling equipment being made available to industry on a purchase or lease basis.

Greatest excitement has been over the development and use of bulk containers which result in lower shipping costs, in solving many storage and warehousing problems, in applying better handling procedures.

Typical of this "new look"



After being filled and sealed, bins are transported by specially equipped lift trucks for loading onto trucks



Truckload consists of three containers totaling 30,000 lb. From the Stauffer plant, the chemical is trucked to National Distillers and Chemical Corp.'s zirconium plant at Ashtabula, Ohio

is the arrangement between Stauffer Chemical Co., and National Distillers and Chemical Corp. to supply raw material for zirconium manufacturing.

Zirconium tetrachloride from Stauffer arrives at National Distillers' new zirconium plant at Ashtabula, Ohio, in 300-cu ft, collapsible, lined, rubber containers. Each container holds 10,000 lb of material. Containers' design allows the reactive material to be blanketed effectively with an atmosphere of nitrogen.

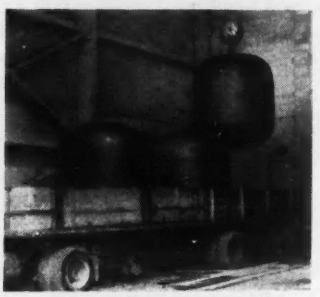
The containers are filled at Stauffer's Niagara Falls plant and transported, three to a truckload, to the Ashtabula plant. Hoists, monorails, and specially equipped lift trucks handle loading, unloading, and intraplant movement.

Containers can be stored outside and used as desired. Special hydraulic clamps empty all contents in "squeeze bottle" fashion to conveyors.

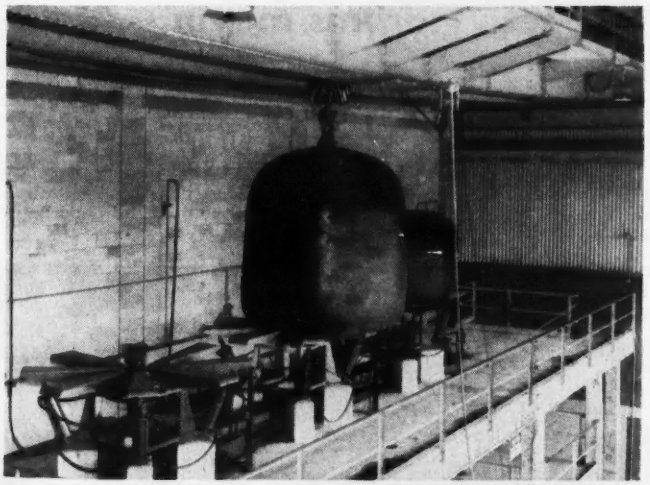
Empty units are collapsed to about 1/10 inflated size, sealed to prohibit entrance of air, and stored in a minimum amount of space. When enough empties have accumulated, they are shipped back to Stauffer. No crating is necessary.

(Sealdbins are manufactured by US Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y.)

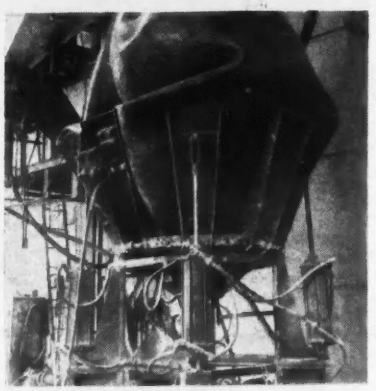
Check 3889 opposite last page.



At Ashtabula, transport is unloaded by hoist. Bins may be stored outside until transported to processing area



Bins are conveyed on monorails to automatic unloaders where contents are emptied and carried to zirconium furnaces



Unloading is accomplished by hydraulic clamps which empty all containers in "squeeze bottle" fashion. Emptied bin is collapsed and shipped back to Niagara Falls

Now... a Powerful New TUBAR DUMPER Specially Designed for Bulk Chemical Containers

The new Tubar Twin-Cylinder Dumper is designed for all-purpose service in paint plants . . . pharmaceutical houses . . . granular plastics . . . and everywhere bulk chemicals are handled. It's built for years of rugged, heavy-duty service . . . cuts chemical container handling costs to the bone. Write for full information and operating specifications.

- **Handles up to 4,000 pounds . . . elevates to 60 inches.**
- **Stops and holds loads at any point in dumping cycle.**
- **Optional splash-proof and explosion-proof power features.**

UHRDEN is serving industry with a full line of all-purpose and special-purpose dumpers. Standard production models . . . or built to your specifications.

Tubar
DUMPER DIVISION
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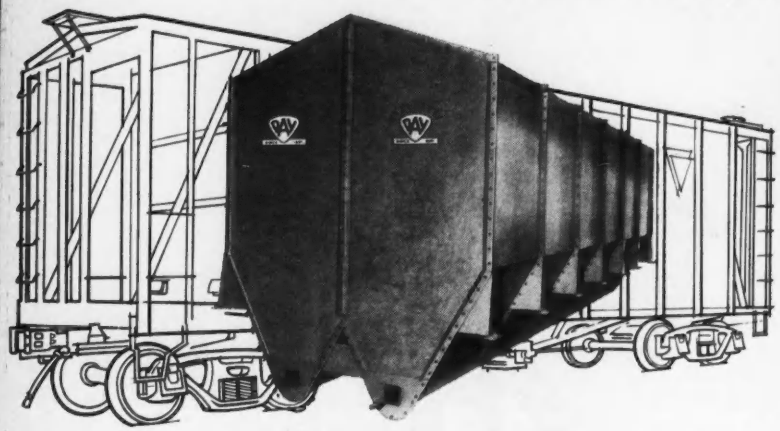
DENNISON, OHIO
Tubar ASSURES QUALITY

U-158-39

Check 3890 opposite last page

DAY

BULK STORAGE NEWS



A CARLOAD OF STORAGE IN ONE 'PACKAGE'

SAVE! Store Chemicals in bulk with **DAY** Tanks

Here's a "package" that's engineered and built for heavy duty service. Compared to bags or other containers, DAY Bulk Tanks store more materials, in less space, faster, better and cheaper. By eliminating bag and labor costs they save up to 35¢ on every 100 lbs. of bulk material handled.

DAY tanks are large enough to actually store a carload or more of material in a single tank. They may be pneumatically or mechanically loaded and emptied. Made in vertical and horizontal styles, DAY tanks are built and shipped in easily erected sections. They have been proven in a wide range of applications. They are sturdily constructed of galvanized, black or stainless steels or aluminum.

Write toDAY for Bulletin 574. This 12-page booklet gives specifications plus money saving facts about sanitary, weatherproof DAY tanks.

The **DAY** *Company*

SOLD in UNITED STATES by
The DAY SALES Company
852 Third Ave. N.E., Minneapolis 13, Minn.

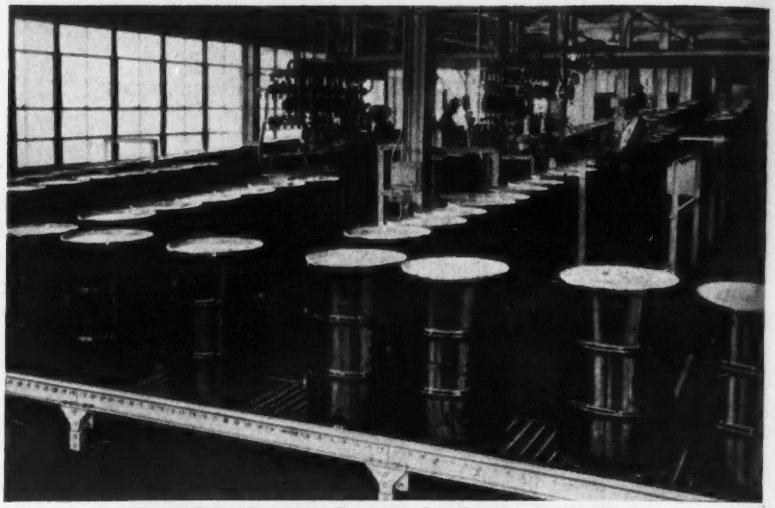
MADE and SOLD in CANADA by
The DAY Company of Canada Limited
P.O. Box 707Y, Fort William, Ontario

Representatives in Principal Cities

EQUIPMENT ONLY OR A COMPLETE SYSTEM

Check 3891 opposite last page

Ask Standard ⋮ *how to cut costs with conveyors*



Live roller and gravity roller system handles 55 gal. drums from storage through filling and weighing operations to shipping.

No manpower needed to keep heavy drums moving

STANDARD conveyor systems keep heavy, bulky commodities moving with minimum manpower and time loss. Systems can be job-tailored to any specific materials handling problem — to meet almost any needs.

With more than 50 years of experience in conveyor application, Standard engineers are qualified and ready to help solve your handling problems. Standard builds permanent or portable systems and units, using roller, belt, slat, chain, push-bar or sectional conveyors — power or gravity; also spiral chutes and pneumatic tube systems. Consult STANDARD CONVEYOR COMPANY General Offices: North St. Paul 9, Minnesota. Sales and Service in principal cities.

Cut costs, too, in shipping and receiving operations with Standard portable units, either powered or gravity operated. (Left) HANDIBELT portable powered conveyor unit (right) LITEWATE Sectional Roller Conveyor.

Call the Standard engineer listed in your classified phone book, or write direct for Bulletin 309 — address Dept. P-3

Standard 50 years of conveyor experience

GRAVITY & POWER
CONVEYORS

Sales and Service in Principal Cities.

Check 3892 opposite last page

Longest conveyor belt . . .

. . . in grain processing industry travels over a half-mile cross-country course, carrying corn from terminal storage elevators at one end of A. E. Staley Manufacturing Company's 400-acre Decatur plant site to holding elevator supplying daily process needs at opposite end.

Handling up to 192,000 bushels per day, conveyor belt replaces intra-plant rail transfer of corn between the two points. Conveyor required more than 300 tons of steel in framework, rollers, enclosures, and mechanism. Over 12 tons of heavy rubber-covered duck belt were used, plus concrete supporting piers and building alterations. Steel catwalk and removable hood sections provide easy access to belt.

(Conveyor belt was constructed by Stephens-Adamson Mfg. Co., Aurora, Ill.)

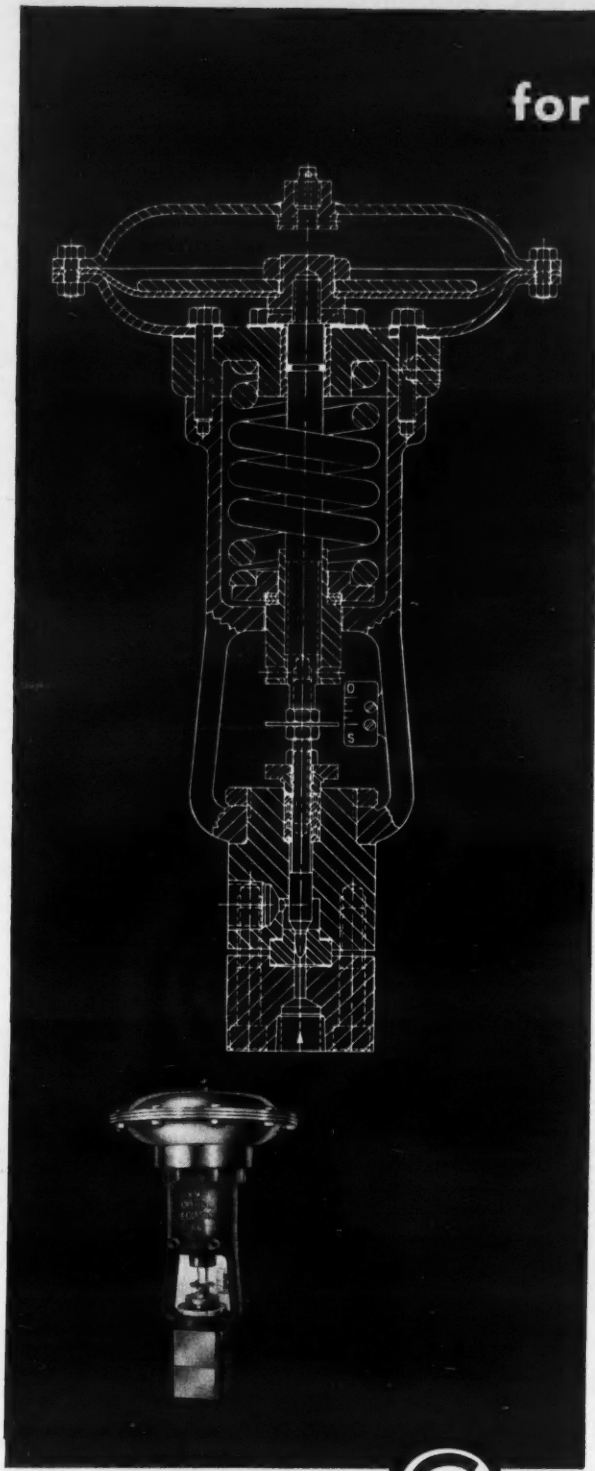
Check 3893 opposite last page.

Bucket elevator design cuts maintenance cost, speeds operation

Special heat-resistant belt furnished with each elevator

Uses: For conveying bulk material from one level to another.

Features: Vertical slide in boot section of bucket elevator minimizes overloading, jamming, and plugging. Adjustable slide plate controls angle of repose of the sand in boot and determines amount



for 10,000 psi service

CASH STANDARD TYPE 505

diaphragm operated high pressure control valve

Specially designed to handle gases and liquids in high pressure drop, on-off or throttling service, with dead-end shutoff.

pressure and temperature rating:

10,000 psi at —40 to 400°F.

action:

Direct or reverse.

packing:

Teflon V-ring, bolted gland.

spring:

Enclosed type with thrust bearing on adjusting screw. 3-15 and 6-30 psi ranges standard.

body:

Forged stainless steel, split body, with hardened stainless steel trim.

connections:

½" and ¾" NPT. Connections for high pressure tubing also available.

What is Your Pressure Control Problem?

Consult the Cash Standard control specialist in your area or write for complete information. Dept. N.

CASH CS STANDARD

A. W. Cash Co. and Its Subsidiary, Cash Standard Stacon Corp.
P. O. Box 551, Decatur, Ill.

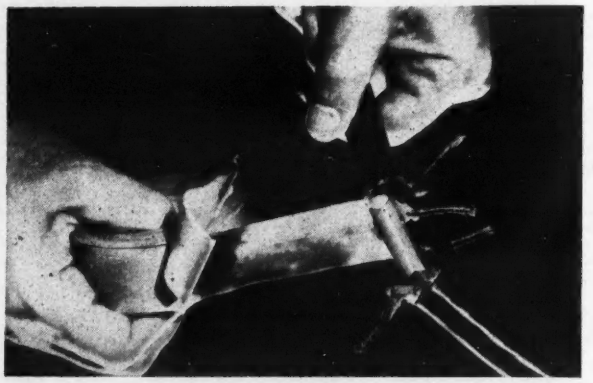
Pressure, Hydraulic, Temperature, Process and Combustion Controls

Check 3894 opposite last page

HOW *HERCULES* HELPS...

MAINTAIN QUALITY STANDARDS—For generations "Evenflo" baby bottles have been a recognized leader in their field. Now Pyramid Rubber Company uses Hercules Hi-fax® high density polyethylene to mold "Evenflo" plastic bottles with even more advantages. Unbreakable, of course, Hi-fax bottles are acceptable by FDA for direct contact with food, can withstand the high temperatures necessary for sterilization. These are just a few reasons why Hi-fax is finding ever increasing use in packaging, toys, fabrics, wire coating and pipe.

ENCOURAGE YOUTH—Pictured with Hercules Vice President Paul Mayfield are winners in the National 4-H Entomology Awards Program. Agricultural Chemicals Division thus plays a part in the development of farm and civic leadership.



CREATE NEW PRODUCTS—Rubber and Asbestos Corporation depends on two Hercules tackifying agents for the unique characteristics of its new "Tackmaster" pressure-sensitive film used in the tape shown. The Hercules materials help provide the high tack, quick stick and grab necessary in such films, plus easy separation from the protective release paper.

HERCULES POWDER COMPANY
INCORPORATED
900 Market Street, Wilmington 99, Delaware

G58-2

CHEMICAL MATERIALS FOR INDUSTRY

HERCULES

Check 3895 opposite last page

of material picked up by buckets. This provides automatic choke-off system.

Description: Specially treated heat-resistant belt is furnished with each bucket elevator. Belts are pre-punched for buckets, which are insulated by pads of same heat-resistant material as belt. This results in cool running belts even when buckets are handling hot material.

Bucket elevators are available in three bucket sizes: 3 x 3, 6 x 4, and 8 x 5″. Maximum discharge heights are 35, 60, and 80′ respectively. Capacities range from 4800 lb/hr of 50 lb/cu ft material to 82,800 lb/hr of 150 lb/cu ft material. Motors are normally furnished as totally enclosed, 3-phase 220/440-volt, for 50/60-cycle use.

(Bucket elevator is product of Carpco Mfg. Inc., PO Box 3272, Jacksonville 6, Fla.)

Check 3896 opposite last page.

Towing tractor data

Engineering, design, and construction features, along with operating data and specifications covering company's recently introduced industrial towing tractors are outlined in four-page bulletin — 337A — Buda Div., Allis-Chalmers Manufacturing Co., Milwaukee 1, Wis.

Check 3897 opposite last page.

THAT'S INTERESTING

Ceramics

A group working at U. of Calif. has been able to bend ceramics. Single crystals of MgO were bent through a substantial angle without fracture.

Results suggest a new class of materials useful to engineering. It may be possible to cast aircraft fuselages in molds, or even make prestressed wings. Ceramics do not lose essential strength properties during exposure to high temperatures.

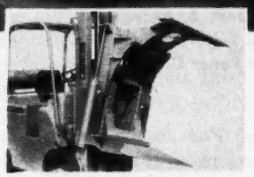
Mutants

Mutant strains of micro-organisms, which obtain the oxygen they need by fermentation rather than by oxidation as the parent organisms do, have been produced. A Russian scientist at the Pasteur Fermentation Centennial reported on this step in the fight to eliminate cancer. Because the organisms are like cancer cells they have been used to test drugs used in anti-cancer programs.

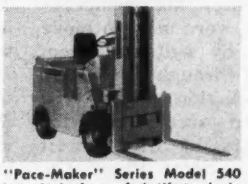
For more information on product at right, specify 3898 see information request blank opposite last page.

Today's industries need Towmotor Continuous Operation

New Towmotor **"Lift & Shift"** Control Raises Productivity - and Profits



Towmotor Standard Accessories that grab, scoop, push-and-pull, ram, revolve and even shift sideways, offer versatility that saves manhours and dollars daily.



"Pace-Maker" Series Model 540 is typical of new fork lift trucks in the combined Towmotor-Gerlinger line. Load capacities from 1500 to 40,000 pounds.

Driving Ease More Than Tripled with new Towmotor power steering! TowmoTorque Drive adds cushioned "creep" control unequalled in the industry today.

It's easy to see how Towmotor fork lift trucks built a reputation for modern mass-handling efficiency! Take a look at the time-saving Side Shifter TowLoader Accessory in the picture.

This fingertip controlled attachment—combined with Towmotor "no-loss" hydraulic power—lifts, lowers and positions loads to either side for accurate, systematic stacking. *Actually pulls loads onto the forks, then pushes them off!*

More work gets done with less fatigue. Motion-saving centralized control — cushioned-comfort seating—dual entry compartment—high free lift — and other standard features give you convincing reasons for buying modern Towmotor-Gerlinger fork lift trucks.

For latest information on the industry's most complete line, send coupon below.

Leaders for 39 years in building Fork Lift Trucks, Tractors and Carriers

TOWMOTOR -GERLINGER
THE ONE-MAN-GANG

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation, Cleveland 10, Ohio

☐ Send free Towmotor Catalog No. SP-23
☐ Send free Certified Job Studies relating to our business, which is

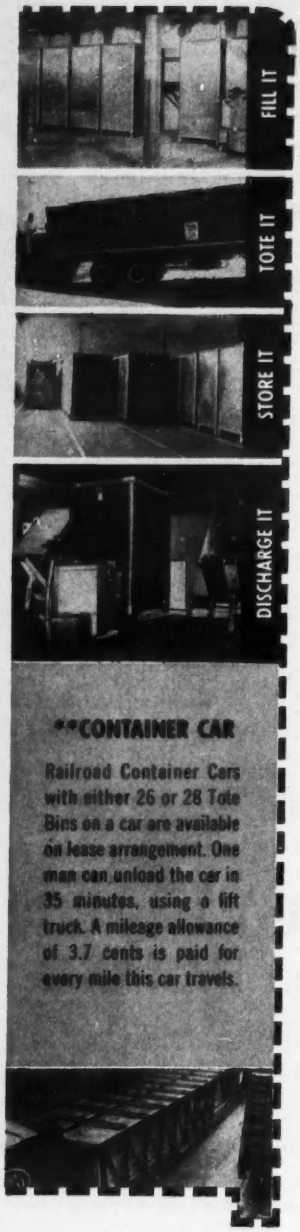
Name_____

Company_____

Address_____

Mail to TOWMOTOR CORPORATION, Cleveland 10, Ohio

in bulk handling
only
TOTE
SYSTEM*
offers every one of these important advantages



Tote System is a complete, mechanical, automatic bulk handling system. It is based on metal bins—aluminum, stainless or carbon steel, monel, or magnesium—plus filling and discharging equipment. Here is what it will do:

1. Tote System effects important economies by eliminating recurring container costs; eliminating product loss, contamination and deterioration; reducing labor and handling costs; reducing warehouse storage space requirements; and preserving original product quality.
2. Tote System handles a diverse list of products, including liquids, both in-plant and inter-plant.
3. Tote System speeds up weighing and blending operations, accurately and automatically.
4. Tote System permits you to weigh incoming materials as a check against invoice weight, and for a permanent inventory record.
5. Tote System permits the use of a minimum, uncomplicated conveyor system with an accompanying reduction in clean-up and maintenance time.
6. Tote System, in handling food products, meets the requirements of all existing sanitation codes.
7. Tote System permits complete transportation flexibility. Tote Bins can be shipped by rail** or truck, or they can be left in the plant and filled from hopper cars or trucks.
8. Tote System can be adapted easily to future requirements. Plant layouts can be changed simply by re-locating discharge stations. Operations can be expanded merely by procuring additional Bins. And Bins can be used interchangeably for different products.
9. Tote System, in small and medium sized installations, requires no more labor to operate than a fixed storage bin system. In extremely large installations, another man may be required, but, in most cases, his time is more than offset by the elimination of highly-paid electronic experts needed to maintain and operate complicated fixed bin storage and conveying systems.

**CONTAINER CAR
Railroad Container Cars with either 26 or 28 Tote Bins on a car are available on lease arrangement. One man can unload the car in 35 minutes, using a lift truck. A mileage allowance of 3.7 cents is paid for every mile this car travels.

*TOTE AND TOTE SYSTEM REG. U. S. PAT. OFF.

Why not let our engineers survey your plant at no obligation? Meanwhile, write for new catalog containing complete details.

TOTE SYSTEM, INC.
680 SOUTH 7th, BEATRICE, NEBR.

Check 3899 opposite last page

Scott Paper Co., replacing steam jets with an air vibrator . . .

removes long-time fire hazard from wood chip handling

WILLIAM E. PASHA
Asst. Pulp Mill Supt.
Scott Paper Company

Problem: For many years, risk of fire in moving wood chips from storage bins to digesters has been ever present in pulp mills. Jets utilizing high-pressure, high-temperature steam were used to move the chips by agitating them downward through bin outlet.

An installation of this type was used successfully for many years at the Detroit Division of Scott Paper Co. However, this operation was also the source of an occasional fire resulting from overheated nozzles. Damaged valves permitted 400°F superheated steam to overheat nozzles going through wooden bulkheads. In addition, prolonged steam flow could ignite closely packed wood particles at bottom of bins.

Maintenance costs on upkeep of valves, swivel joints, rotating nozzles, gears, and connecting equipment became increasingly high on Digester Department's books.

Solution: Taking these points into consideration, management decided to find a substitute for the steam equipment. It was decided to investigate a pneumatic vibrator.

The first two vibrators were ordered early in 1956. On May 1, 1956, trial began and, throughout the year, proved successful. An additional 15 pairs were purchased and installed by May 1957.

Air piston operating on 40-psi regulated air pressure is mounted on outside of sloping bin sides. Unit is bolted flush against sloping sides of bin with hold-down bolts running through wooden partition.

On inside of bin, these bolts also hold a 3-ft square strik-

◀ Pneumatic vibrators (top arrow) have replaced steam jets for moving wood chips from wooden storage bins. Operator opens quick-acting valve (bottom arrow) to emit 40 psi air to operate units

ing plate. This plate receives impact of vibrator through the wooden bin wall and transmits shock to surrounding wood chips. Two 4-inch units are located on each bin.

Vibrators are placed on opposite walls of the bins, and operate simultaneously from one lubro-control unit. There are 16 bins servicing eight horizontal digesters, each bin servicing an end of each digester.

Each pair of vibrators is connected to a 100-psi air supply regulated to 40 psi. Half-inch oil line lubricator and quick-opening valves are in series with each set. The operators open and close quick-acting valves in a series of short bursts or in one continuous operation as packed chips demand.

Results: The use of vibrators has done away with the excessive noise of the charging jets and heat of the steam. Fire hazards from overheated piping systems were immediately eliminated.

Efficiency of bin vibrators matched the former steam jets for all practical purposes.

At present time, no adverse effects have been found in wooden bin structure from impact of the hammers. Steam savings have amounted to some 22,260 lb per day. Vibrators consume 10 cu ft of air per minute during continuous operation.

Maintenance at present has been zero. (This does not include lubrication oil costs.) It is felt that maintenance costs will continue to remain low due to absence of mechanical parts in the vibrators.

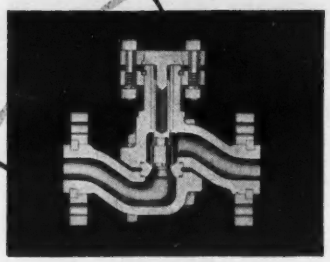
Improved working conditions particularly in summer have been welcomed by all personnel.

(BH-4 Pneumatic Vibrators are manufactured by National Air Vibrator Co., 2370 W. 7th St., Cleveland 13, Ohio.)

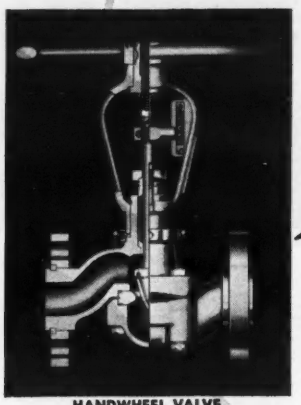
Check 3900 opposite last page.

AROUND-THE-CLOCK RELIABILITY with Annin

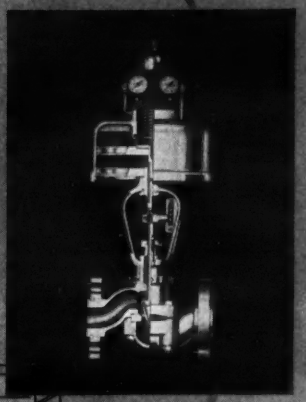
The complete line of Fluid Control Valves to meet every installation requirement



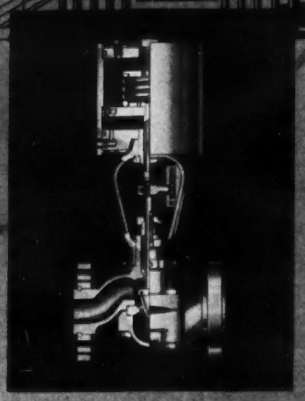
CHECK VALVE



HANDWHEEL VALVE



DOMOTOR VALVE



CYLINDER VALVE

Yes, *Annin* offers design and control engineers a complete line of valves for rugged and reliable performance "around-the-clock." Name the installation—rocket stand, aircraft component test facility, chemical plant, refinery, paper mill or power plant—and *Annin* valves will exceed the most critical performance needs, with features like:

- Piping flexibility
- Pressure ratings to 10,000 PSI
- Body designs for gases to molten metals
- Temperatures from −400°F to +1600°F
- Interchangeable operators—Domotor, Cylinder or Handwheel

ANNIN'S new and comprehensive valve catalog 1500-C is now ready for distribution. Send for your copy today.

Annin

ANNIN Control VALVES

THE ANNIN COMPANY
4570 EAST TELEGRAPH ROAD, LOS ANGELES 22, CALIFORNIA

Check 3901 opposite last page

with **BIFURCATOR® FANS**

This divided housing fan is a product of over 30 years' experience in design and development. It is specially engineered and built for efficient removal of corrosive, hazardous and high temperature fumes from industrial plants and areas including:

CERAMIC PLANT INSTALLATIONS ★ CORE BAKING OVENS ★ ELECTRO-PLATING TANKS ★ FOOD PROCESSING OVENS ★ GLASS PLANTS ★ METALLURGICAL PLANTS ★ PAPER MILLS ★ POURING AND SHAKE OUT AREAS ★ TEXTILE MILLS

FOR FURTHER INFORMATION
SEE OUR SECTION IN
SWEET'S
PLANT ENGINEERING OR
INDUSTRIAL CONSTRUCTION
CATALOGS
OR WRITE FOR COPY

De Bothezat FANS
A DIVISION OF
American Machine and Metals, Inc
EAST MOLINE, ILLINOIS

Check 3902 opposite last page

Quality bulk storage

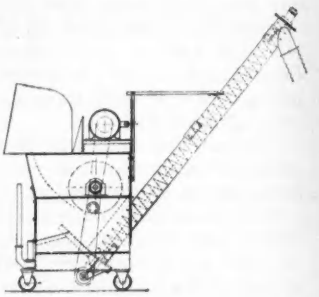
Manufacturer's tank claimed to give quality bulk storage at low cost, plus handling ease for all dry granular materials is illustrated and described in four-page bulletin. Specifications are listed for all models. Form 1612-10-57 — Butler Manufacturing Company, 7400 East 13th St., Kansas City 26, Missouri.

Check 3903 opposite last page.

Breaker-conveyor unit eliminates five handling steps

Uses: Crushing and delivering materials to storage bins in one operation. Unit is designed to handle all semi-friable bulk materials from ½ to 5" thickness.

Features: Unit consists of chemical breakers and screw conveyor driven by same motor. Use of unit eliminates usual palletized drum handling between operations.



Unit will crush up to 100-tons material per hour and convey it to storage bins

Description: Heavy-duty breaker-conveyor unit is capable of crushing up to 100 tons per hour. Conveyor is timed to operation of breaker.

In operation, material is fed into breaker through a hopper opening. The material drops onto a revolving drum strung with lines of steel spikes that pass between teeth of an adjustable steel comb-plate attached to walls of breaker.

As drum turns, particles fall through openings between drum and teeth of comb, and

for more accurate chemical feed control at LOWER COST use a...

"Packaged"

NEPTUNE

CHEMICAL FEED UNIT

JUST PIPE-IN . . .

PLUG-IN . . . AND OPERATE!

You'll get positive, accurate proportioning of chemicals when you use a NEPTUNE "packaged" chemical feed unit. That's because tank, agitator and pump are designed and built into one precisely-engineered chemical feed system. In addition to lower first cost and minimum upkeep, longer life is assured by 316 stainless steel piston, valves and ball checks.

- **simply designed pump can be regulated easily to proportion exact quantities of chemical continuously**
- **agitator keeps precipitates from settling, assuring constant solution strength**
- **Y-type strainer removes harmful solids, prevents pump damage**

Tank, agitator and pump are combined in one smooth operating system that precisely proportions anything from treating chemicals, such as calgon, to petroleum distillates.

Write, wire or call for additional details and let us bid on your requirements.

NEPTUNE PUMP MANUFACTURING CO.
chemical proportioning pumps and sump pumps

4912 NORTH 6TH STREET
PHILADELPHIA 20, PA.
phone: DAvenport 9-4983

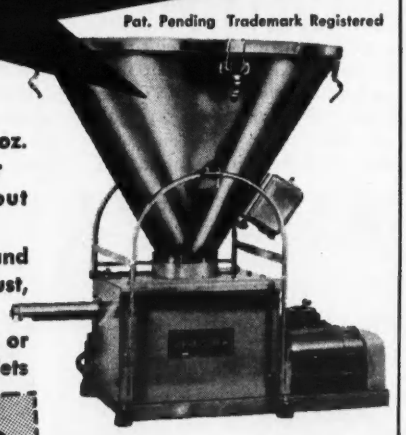
Check 3904 opposite last page

New! **Vibra Screw**

METERS SOLIDS LIKE LIQUIDS

Pat. Pending Trademark Registered

with unparalleled accuracy!



- ★ **Continuous flow rates from 1 oz. per hour to 100 tons per hour**
- ★ **Dust-free operation without bridging or flooding**
- ★ **Accuracy with simplicity and ruggedness—unhindered by dust, dirt or corrosion**
- ★ **Handles all materials, sticky or free-flowing—powders or pellets**

Vibra Screw

1 MONTGOMERY STREET
BELLEVILLE, NEW JERSEY

Write to Dept. "M" for latest Bulletins.

Check 3905 opposite last page

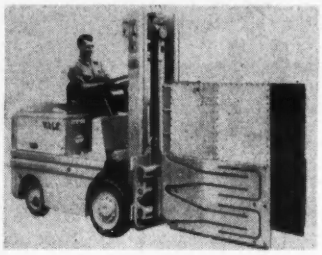
out the bottom of breaker. Operator controls particle size by varying distance of comb-plate from drum surface.

Small pieces then move to screw conveyor, consisting of half-pitch screw enclosed in a tube, both of stainless steel. Material then passes through delivery opening at top of conveyor into a flexible connector.

Maintenance of unit involves periodic lubrication and wash-down when changing from one chemical to another. Three gasketed clean-out openings in conveyor, a gasketed removable back plate and a capped drum cleanout on breaker body facilitate maintenance.

(Breaker-conveyor is manufactured by Gifford-Wood Co., Hudson, N.Y.)

Check 3906 opposite last page.

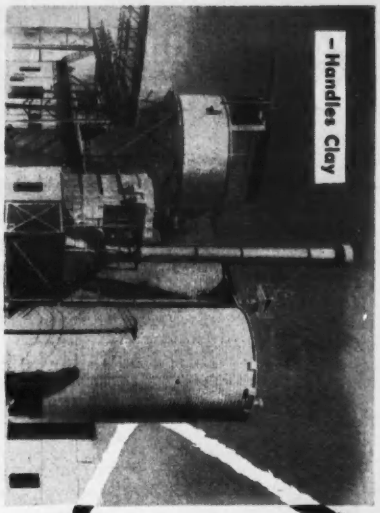


Space saving arms . . .

. . . of carton clamp permit closer stacking of cartons and better utilization of valuable storage space. Articulation of clamp is accomplished through deflected metal construction of the arm. Bulky articulation arrangements on outside of clamp area are eliminated.

Actual clamping surface is rough top rubber bonded to thin metal sheet which is attached to aluminum pad. Range of clamp is 22 to 68". Typical load capacity is 2400 lb at 21" load center on 4000-lb capacity truck. Carton clamp is product of Materials Handling Div., The Yale & Towne Mfg. Co., 11,000 Roosevelt Blvd., Philadelphia 15, Pennsylvania.

Check 3907 opposite last page.



Before we built this bin we had to know...

1. **The characteristics of the material.**
2. **The method of loading.**
3. **The method of discharge.**

Over a long period of years, we here at Neff and Fry have learned that a *strong bin* is only part of the storage problem.

While we do not sell machinery, nor are we affiliated with any machinery manufacturers, we can be of great help to you in suggesting loading and unloading systems.

On your next storage bin, call us in on the early stages of planning. You will have a better bin.

NEFF & FRY • 166 Elm Street, Camden, Ohio

N & F

The difference is in the shape of the STAVE!

Check 3908 opposite last page

Positive bin level control— no overflows...no empties

with

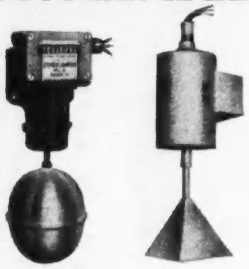
STEPHENS-ADAMSON

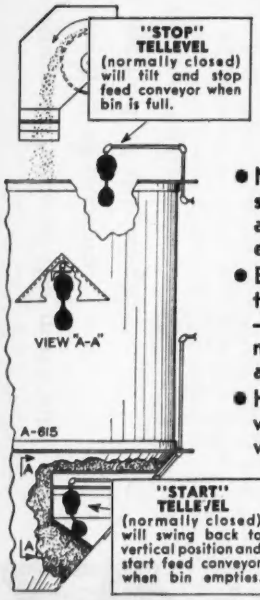
"TELLEVEL"

BIN-LEVEL CONTROLS

- Pendant float-ball or float-cone, operates sensitive switch to regulate level of bulk materials.
- As material level rises or falls, "Tellevel" will start or stop feed-conveyors or elevators.
- Will operate light or horn signal.
- Completely automatic system of material control can be arranged by installing "Tellevel" at various levels within bin.

3 MODELS AVAILABLE




"STOP" TELLEVEL (normally closed) will tilt and stop feed conveyor when bin is full.
VIEW "A-A"
A-615
"START" TELLEVEL (normally closed) will swing back to vertical position and start feed conveyor when bin empties.

- Normal-Duty "Tellevel" consists of a sturdy dust-tight aluminum casing which houses enclosed switch.
- Explosion-Proof "Tellevel" features an explosion-proof switch — for use with hazardous materials and in explosive atmospheres.
- Heavy-Duty "Tellevel" for severe operating conditions — withstands heavy lumps.

WRITE FOR BULLETIN 11-0

STANDARD PRODUCTS DIVISION

STEPHENS-ADAMSON MFG. CO.

11 Ridgeway Ave. Aurora, Illinois

Check 3909 opposite last page

Two-way radio keeps driver of waste pick-up truck in touch with plant

Getting rid of processing residues and plant refuse was big problem until American Maize adopted . . .

one man mechanized handling of waste — a $30,000 saving

Truck operator pictured above is receiving instructions via radio telephone to pick up container of spent char from vegetable oil processing. Actually this phone call denotes an emergency. Usually, the truck observes a regular schedule.

This is typical of the ease with which waste is handled at American Maize Products Co., Roby, Ind., by special containers and a single pick-up truck.

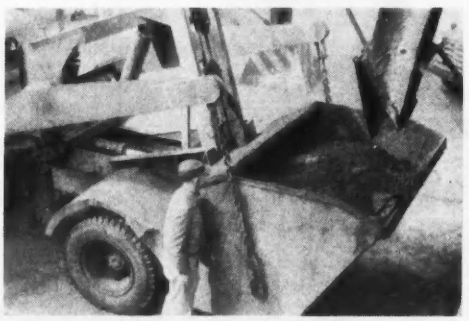
Truck services over 30 waste-accumulation points per 8-hour day, handling residues, solids, liquids, rubbish, waste paper, trash, and assorted metal scrap.

To meet varying requirements, four different types of containers are used. These are: 1) open box; 2) closed box; 3) bottom dump; 4) end over. They are all basically similar with design features that aid handling of specific loads.

In addition to char there are wastes from starch department, from mill house, and from syrup production. Dust that accumulated on roof of feed house was formerly swept off manually and then shoveled into truck. Now a dust collector handles it, discharging into a waiting container. When picked up most of it can be recovered for reuse in cattle feed.

Under conventional waste-collection method several dump trucks were needed with waste and rubbish being shoveled manually.

With one-man mechanized handling, driver merely backs up truck to waiting container, dismounts from cab and attaches lifting links. Returning to cab he uses simple controls which put into oper-



Spent char dumps directly into a container for transfer to plant dump. No accumulation in piles — no shoveling by hand

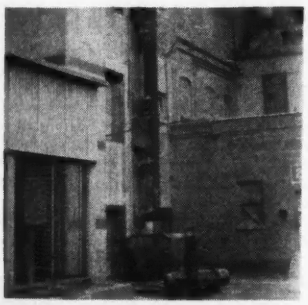
Load is dumped without driver leaving truck cab. Hydraulic cylinders provide positive, fast action

ation two hydraulic cylinders attached to head frame.

Boom raises container onto skid frame. Container is then moved forward on frame hydraulically. Boom also lifts containers for dumping. Truck travels between 75 and 100 miles per day in traversing the 35 acres encompassed by actual plant facilities, and in making trips to plant dump area. Tract covers 83 acres.

Savings enjoyed since system was put into operation amount to $30,000 a year in labor alone. No dust, no blowing trash, no unsightly piles of rubbish or hazardous accumulations of scrap, pipes, metal, lumber. Recovery of by-products contributes to savings.

One of the most profitable applications of the system, however, is in salvage work. Containers always in place on a stand-by basis aid collection of scrap and separation of pipe, fittings, valves, etc. Material to be sold can be stockpiled for pick-up.



Container receives miscellaneous trash, from five different floors

That marked for reuse by plant can be transferred to suitable storage. Material of no value is dumped. In one year over 700,000 lb of segregated iron was handled, each item being delivered to its individual pile. Scrap paper handled in that year amounted to 300,000 lb.

An indirect but important benefit lies in contribution to better community relations. Protection of neighborhood from dust and dirt has been a force in building good will.

(Containers and truck are manufactured by Dempster Brothers, Inc., Knoxville 17, Tenn.)

Check 3910 opposite last page.

FIRST

NOW — Allis-Chalmers Vibrating Screens

FLOAT ON AIR

NEW cars, modern trucks and trains utilize air springs for the smoothest, best controlled ride obtainable. Now Allis-Chalmers has applied the *same type air springs to vibrating screens* to provide greatly improved screen performance.

For complete information, see your nearby A-C representative, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wis. Ask for Bulletin 07B8931.

A-C ALLIS-CHALMERS

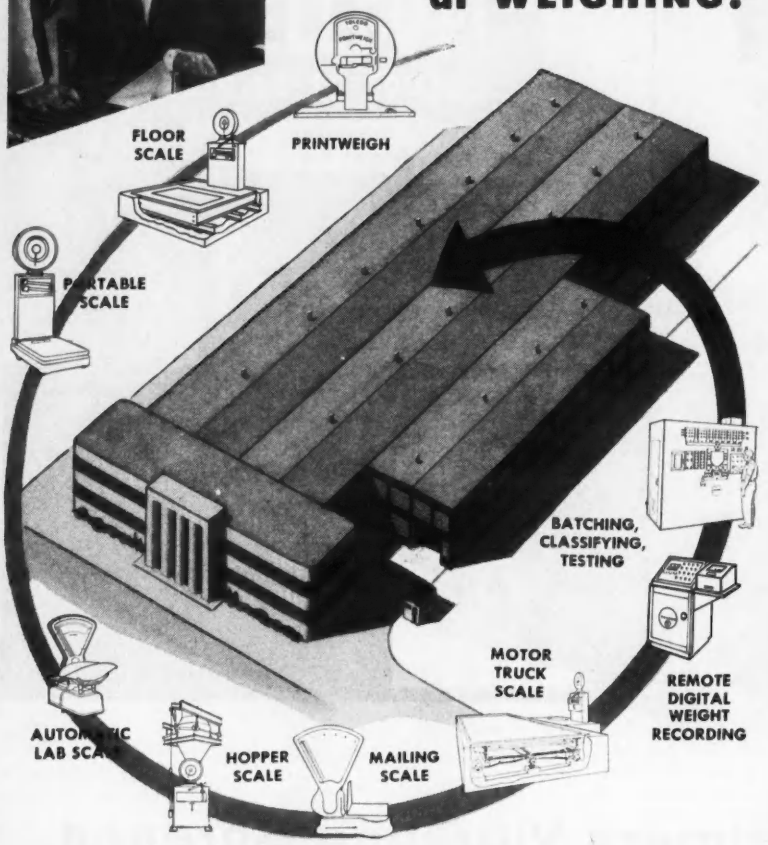
ALLIS-CHALMERS

A-5662

Check 3911 opposite last page

Studying Costs? It pays to start with a

Plant-Wide Look at WEIGHING!



You can lessen the impact of rising costs by making sure your scales are doing the best possible job. Remember that weighing today is not a job for isolated scales—it's a vital element in your overall cost control system.

Weight records directly affect costs, quality, inventory control and customer billing. Weighing errors, or inadequate weight data, can be avoided by having the right scales in the right places . . . all carefully integrated in a plant-wide weighing system to supply basic records on materials received, shipped or transferred. Check your needs now! TOLEDO SCALE, Div. of Toledo Scale Corp., 1423 Telegraph Road, Toledo 13, Ohio.

TOLEDO SCALE *Headquarters for Weighing Systems*

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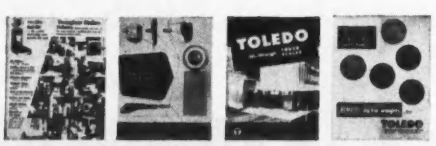
☐ **NEW TOLEDO WEIGHT FACT KIT**

will help you determine how well your scales measure up as a weighing system—help you detect weighing losses that drain profits. Request your kit now. No obligation.



☐ Industrial Scale Line ☐ Electronic Load Cell Scales ☐ Motor Truck Scales ☐ Electronic Remote Digital Weights

☑ WE'LL BE GLAD TO MAIL THE LITERATURE YOU CHECK.

Check 3912 opposite last page

MATERIAL HANDLING

Up, down, around — one conveyor goes where you want it

Uses: Conveying cartons and other items everywhere in the plant.

Features: With one conveyor and one drive, horizontal, up, down, and power turns are obtained as desired.

Description: Unit consists of series of small trucks connected by steel linkages into an endless chain. Trucks are guided by full rolling contact in a track and are driven by caterpillar-type drive. Pushers extend up from trucks to engage articles and positively propel them along the bed over path at any speed.

Section of continuous conveyor installation showing two horizontal runs; one 180-degree power turn; and an 80-degree up-run from only one conveyor

Unit comes in straight sections; 30-, 45-, 90-, and 180-degree horizontal turn sections; 30-, 45-, 60-, 80-, and 90-degree vertical turn sections, both up and down, a take-up, and a drive.

Bed sections come in 14-, 20-, 30-, and 40-in widths. Width of legs is 12 in and minimum overall height from floor is 12 in, not including a return run.

System may be either floor or ceiling mounted or bench supported. Sections are bought from stock and assembled like a model railroad. Sections can be added on; its length reduced; or its path changed as desired.

("Multi-veyor" is manufactured by Econ-O-Veyor Corp., 224 Glen Cove Ave., Glen Cove, N.Y.)

Check 3913 opposite last page.

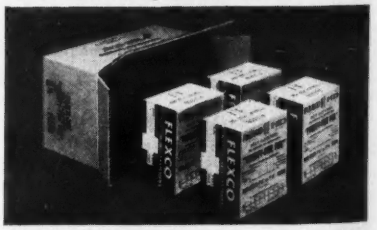
NEW FOR YOUR CONVENIENCE...

FLEXCO "25-PAK"

TWENTY-FIVE COMPLETE SETS OF FLEXCO HD BELT FASTENERS NOW AVAILABLE IN ONE EASY-TO-HANDLE ECONOMY BULK PACKAGE

There's no need now to carry several 10-set boxes to the job—every "25-PAK" contains 25 complete sets of FLEXCO Fasteners (bottom plates, top plates, clips, nuts and bolts) . . . enough FLEXCO Fasteners to join common belt widths (for example: one "25-PAK" box, size 1½E, will join a 36" belt.) Our savings from bulk-packaging are passed on to you!

Label on each "25-PAK" box has chart indicating the number of FLEXCO HD Fasteners to use for given belt widths.



Standard shipping carton contains four "25-PAK" boxes of one size fastener. Keep a supply of "25-PAKS" on hand. Easy to store and inventory, sturdy boxes and shipping cartons have many uses.

Ask your FLEXCO distributor or write to us for additional information.

Flexible STEEL LACING COMPANY

4649 LEXINGTON ST. • CHICAGO 44, ILL.

FOR THE SPLICE OF A LIFETIME

Check 3914 opposite last page

THAT'S INTERESTING

Packed poison

This will not be good news to rats or mice. Up to now, bait could not be stored for long on the shelf because mold and racidity made it unacceptable to the rodents. Now American Can Co. has joined with Niagara Chemical Div., of Food Machinery and Chemical Corp. to put poisoned bait in vaccuum-packed, key-open cans. Food chains are more receptive to stocking this package. The can itself converts into a feeding station easily.

Modern stamp

A chemical will play a big part in making hand sorting of mail a lost art in the British post office. A violet-colored stamp is coated underneath the gum with a chemical which conducts electricity. The graphite - loaded compound, called naphthadag, will enable a machine to electronically face mail. This first chemically coated stamp is harmless.

For more information on product at right, specify 3915 see information request blank opposite last page.

10,000 hours . . . only $700 repair costs

Work record of first Michigan Tractor Shovel important since today's Michigans have same basic power train design

When the first Michigan Model 75A Tractor Shovel rolled out of Clark's Benton Harbor (Michigan) plant in 1954, company engineers *knew* it was good. But who could expect it to put in 10,000 working hours on a tough job . . . and still be "good enough to last many, many more years," (according to the satisfied owners, Indiana Farm Bureau's Indianapolis fertilizer plant). Five months a year, their "old" 1¼-yard Michigan Tractor Shovel operates on *a three-shift basis*—moving an average of 60,000 pounds of superphosphate and other materials *per hour* from storage piles to mixing units. It also handles mixed fertilizer, cleans spillage, and pushes freight cars.

Still has original tires, axles

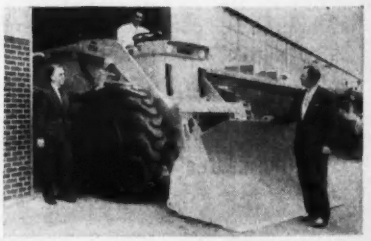
In service equivalent to 5 years' normal 8-hour-a-day use, replacement parts have cost only $700, according to Lewis Risinger, Master Mechanic. "And," he says, "we've *never broken an axle, or replaced a tire,* which is unusual in our operation. I need only three socket wrenches to take the whole power-train apart—it's a fast, simple job that sure cuts downtime."

Operator praises power shift transmission

"I've noticed," says Plant Supt., Melvin Leach, "that whenever there's a choice, operators always pick the Michigan. Even a new man learns to operate it in a hurry." Operator Bob Jefferson especially likes the "power shift and steer, the bucket action, and the fact you don't have to 'grind' gears and wheels to keep close to the pile."

Liked the first— bought four more

Since he authorized purchase of this first Michigan Tractor Shovel, Ben Scharrer, head of the Bureau's Fertilizer Division, has bought four more Michigans for Bureau plants in Indianapolis and Jefferson, Indiana. "One of the things I've been pleased to see," says Mr. Scharrer, "is that there have been no changes in the basic Michigan design. Except for natural wear, the first Michigan is as up-to-date as machines coming off the line today!"



6000th MICHIGAN NOW ON THE JOB

Michigan Tractor Shovel No. 6,000 —produced a little over two years after the first one—is now at work for Ohio Gravel Co., Cincinnati. It has the same all-Clark "flywheel to drive-wheel" power train as do the first and all other Michigan Tractor Shovels.

Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
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2491 Pipestone Road
Benton Harbor 18, Michigan

In Canada: Canadian Clark, Ltd., St. Thomas, Ontario

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2000 LB. - 3000 LB. and 6000 LB.

SCREWED and SOCKET WELD STAINLESS STEEL FITTINGS

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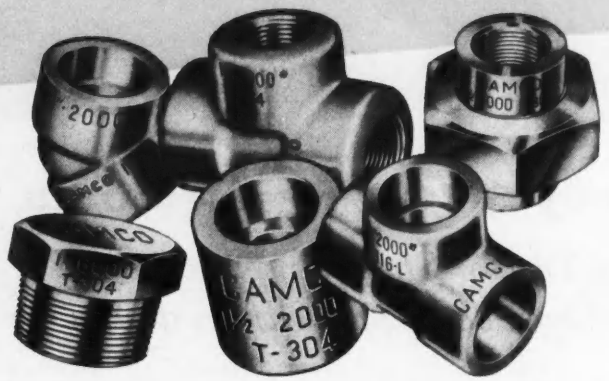

CAMCO Extra Heavy Fittings are machined from solid drop forgings and are recommended for use where severe pressure-temperature conditions are encountered. Materials conform to ASTM-A-182 where applicable. Dimensions conform to SP-49-1956 edition for screwed fittings except SP-50-1956 for hex plugs and bushings.

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Also available—150 lb. screwed fittings, MSS and ASA flanges and all schedules of buttweld fittings.

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- ☐ Please send Flange Dimensional Slide Rule.
- ☐ Catalog Extra Heavy 657.
- ☐ Catalogs covering complete line.
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THE *Quality* LINE IN STAINLESS

CAMCO PRODUCTS, INC.

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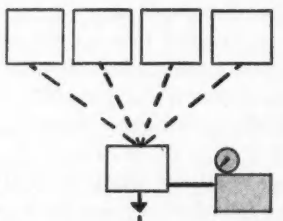
Check 3916 opposite last page

PUSH BUTTON BATCHING

BATCHMASTER speeds chemical processing

At last, completely automatic one-man batching for *you*. Batchmaster is the simple, speedy system for precise mixing of multiple ingredients to any desired formula. Accommodates all materials — solid, powdered, granulated, liquid. Provides *continuous* automatic control of all ingredients by weight. Boosts production, improves quality control, eliminates waste.

Simply dial the formula and mixing times, select number of batches, and press start button. Any number of ingredients are automatically fed, weighed, mixed and discharged.



No need for expensive, complex custom installations. Howe engineers *standard* Batchmaster systems tailored to *your* operation. Guarantees proper batching for most critical formulas. Cuts operating costs. Provides better control of material costs. Rugged construction for extreme operating conditions. You have a *different* batching problem? Send for detailed booklet illustrating the Batchmaster solution.

TO TRUCKS, PACKAGING, OR FURTHER PROCESSING.

Write for Complete Details

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THE HOWE SCALE CO. · RUTLAND, VERMONT

A SUBSIDIARY OF SAFETY INDUSTRIES, INC.

Check 3917 opposite last page

Storage space saved . . .

. . . as well as reduced replacement of worn pallets by device consisting of load-carrying plate, pusher rack, and gripper jaw. With this industrial truck attachment, loads are carried on thin steel sheet instead of conventional pallets.

Flap at edge of sheet is gripped by hydraulically actuated jaws, and sheet, plus its load, is pulled onto load-carrying plate. Load removal is accomplished by upright pusher rack which has up to 50" of forward travel. Capacities of attachment vary from 1800 to 3700 lb at 24" center, depending upon capacity of truck. Pul-Pac attachment is available from Industrial Truck Div., Clark Equipment Company, Battle Creek, Mich.

Check 3918 opposite last page.

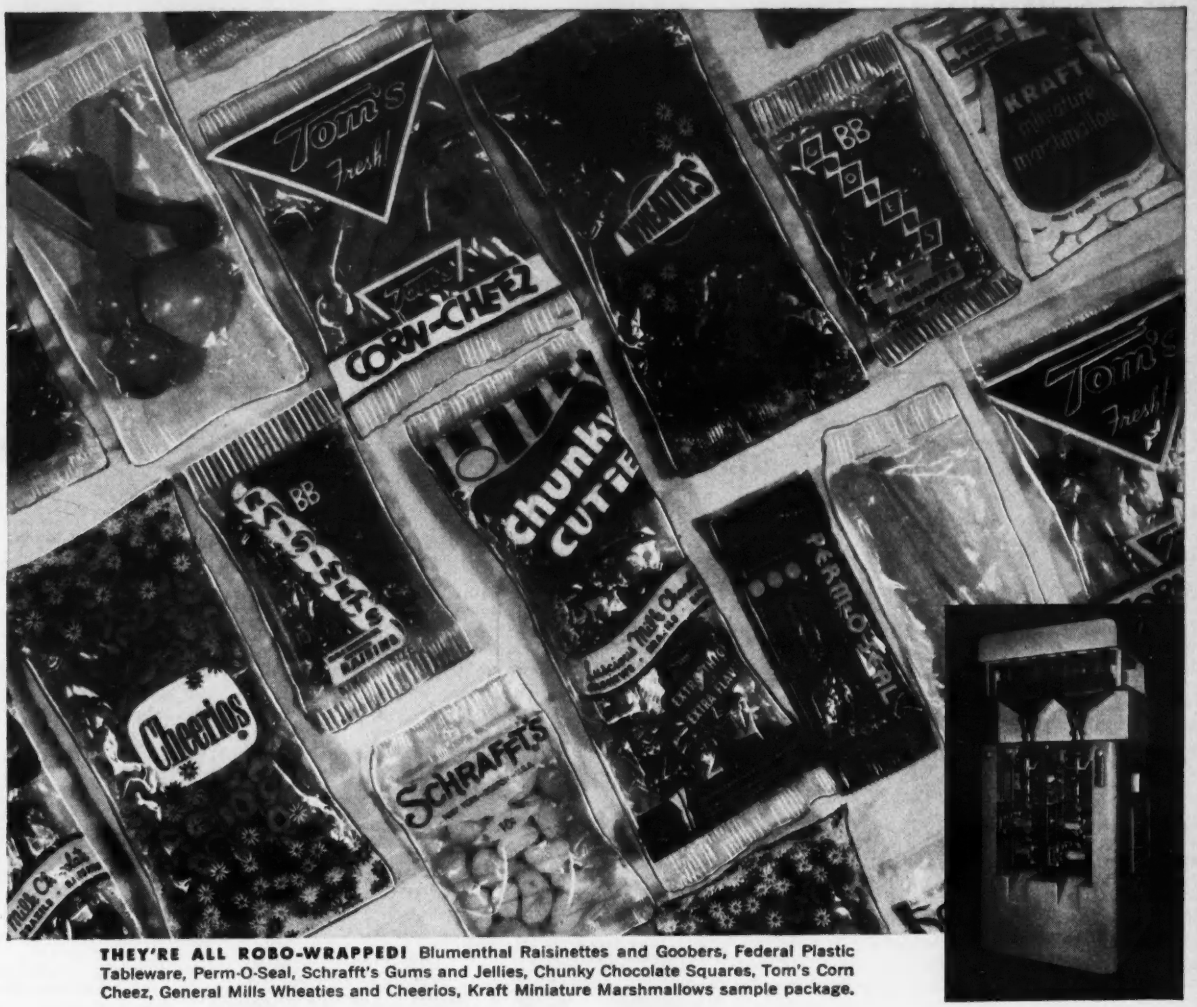
Mechanized cart speeds charging, discharging of conical blender

Makes operation fast, efficient, without dust or spillage

Uses: Besides transportation of materials, mechanized cart is also used for rapid charging and discharging of conical blenders.

Features: Cart's platform elevates container to desired height, so that both cart and container can be attached to blender. By rotating complete assembly 180°, contents are charged or discharged without dust or spillage.

Description: Carts are manufactured to accommodate various heights of standard fiber containers. Once cart and container are attached securely to blender, complete unit is rotated to charge contents by



THEY'RE ALL ROBO-WRAPPED! Blumenthal Raisinettes and Goobers, Federal Plastic Tableware, Perm-O-Seal, Schrafft's Gums and Jellies, Chunky Chocolate Squares, Tom's Corn Cheez, General Mills Wheaties and Cheerios, Kraft Miniature Marshmallows sample package.

FORM, FILL, SEAL AUTOMATICALLY
PILLOW-PACKAGING CUTS COSTS

Does your product belong in this picture? It does if automatic packaging can save you money. Doesn't matter whether you package solids, powders, granules or liquids . . . Robo-Wrap heat seals them in a single or double wall of cellophane, paper, polyethylene, Foil Laminates, Mylar or Saran. Hand-over-hand method forms, fills and seals packages from a continuous roll for highest efficiency. Robo-Wrap changes package size quickly, too. Write for booklet that gives facts on low maintenance and higher efficiency.

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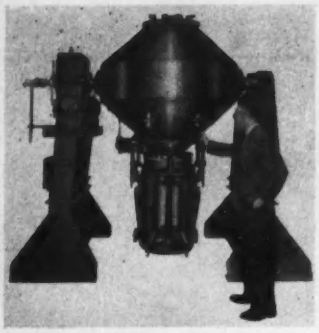
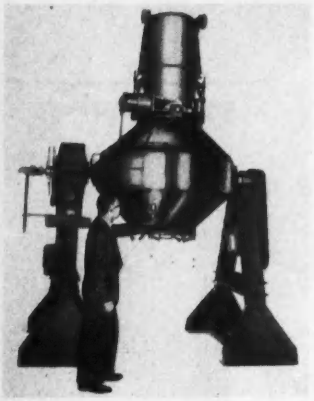
Meet us at PM and ME show, Atlantic City, March 24-26, Booth 401

Check 3919 opposite last page



Mechanized cart and container attach to conical blender and...



...by rotating complete assembly 180°, material is charged to blender without any dust or spillage

gravity. Air-operated valve allows material to be charged without dusting or sifting, which would normally be caused by air turbulence.

("GEMCO Economizer" is manufactured by General Machine Co. of N.J., 55 Evergreen Avenue, Newark, N.J.)

Check 3920 opposite last page.

'Weighing' profits

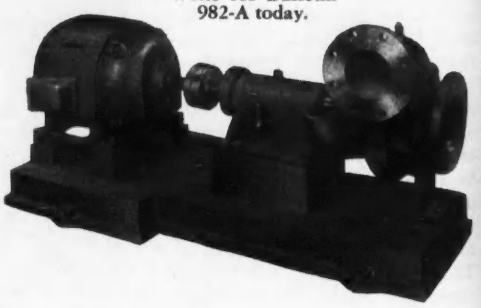
Handy six-page folder describes manufacturer's scales and illustrates some of their proven applications. Folder points out how greater profits can be realized through accurate control of weight. Form 674-C — The Howe Scale Company, subs. of Safety Industries, Inc., Rutland, Vermont.

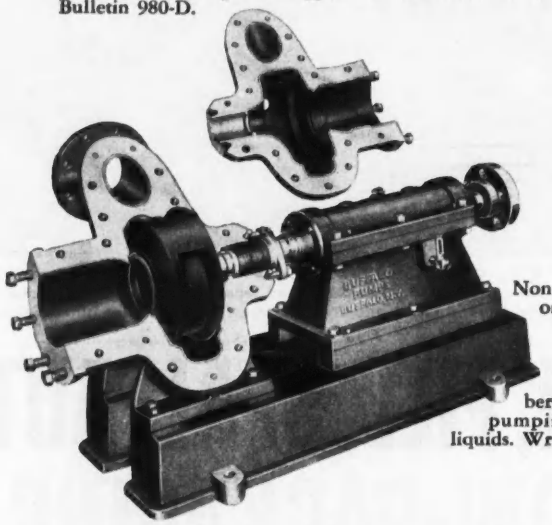
Check 3921 opposite last page.

Clear Water — The "Buffalo" Type "SL" Double-Suction Pump is recognized for its highly efficient clear water service throughout industry. Capacities from 10 to 14,000 gpm. Write for Bulletin 955-R.

High Pressure — The "Buffalo" Type "RR" Multi-Stage Pump is ruggedly engineered to deliver peak efficiency on boiler feed and other clear water applications against heads as high as 1500 feet. Capacities range up to 900 gpm. For full details write for Bulletin 980-D.

Chemical Liquids — The complete "Buffalo" line includes ten specially designed pumps for chemical liquids. Available in several types of construction for handling a wide variety of corrosive, abrasive or high-consistency liquids. Write for Bulletin 982-A today.





Non-Clogging — "Buffalo" Diagonally Split-Shell Pumps are designed for moving high-consistency liquids, with down-time reduced to an absolute minimum. A number of models are available for pumping abrasive and corrosive liquids. Write for Bulletin 953-K.

WHATEVER YOUR LIQUID-MOVING PROBLEM, THERE'S PROBABLY A "BUFFALO" PUMP TO SOLVE IT!

And the fact that "Buffalo" builds a *complete line* of pumps — a type, size and capacity to fit almost every liquid-moving need — can save you money right from the start. It means you never need to pay for "more pump" than you actually require.

You'll find a "Buffalo" Pump to match your exact requirements, with complete assurance of the utmost efficiency, dependability, ease of maintenance and long-range economy. Just contact your nearest "Buffalo" engineering representative, or write us direct. We'll be glad to recommend the pump that's best-suited to your needs.

THE COMPLETE "BUFFALO" LINE ALSO INCLUDES: Heat Transfer Pumps, Close-Coupled Pumps, Sump Pumps and Raw Sewage Pumps. Special alloys available in all models.

Engineered into every "Buffalo" Pump is the famous "Q" Factor — the built-in QUALITY which provides trouble-free satisfaction and long life.

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A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

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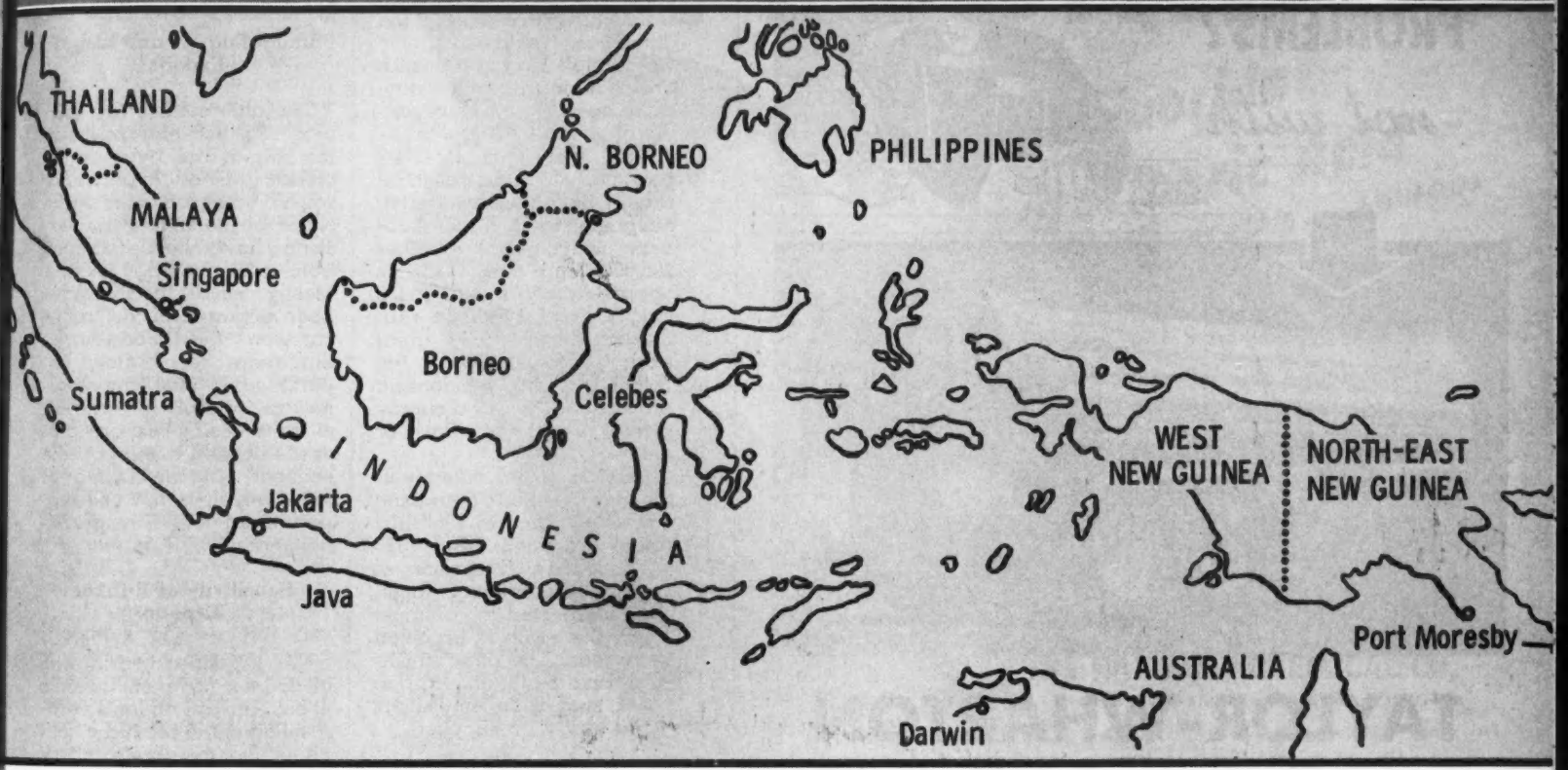

This is Indonesia, source of 40% of the world's natural rubber, and whose internal troubles may spell more growth for the US's synthetic industry

A "Suez" Ahead In Rubber Markets?

Presently operating at only 70% capacity, the US synthetic rubber industry may soon be called upon to supply a large share of the world's (mostly Europe's) needs for rubber.

What's the reason? The Indonesian crisis may "blow-up" any minute. Although compromise is possible, President Sukarno of Indonesia has demanded West New Guinea from the Dutch, threatening a resort to "methods which will startle the world." One of the actions is said to be the "nationalization" of Dutch Indonesian property which began in late November.

Immediate result of Indonesia's problems would be seen in synthetic rubber production increases all over the world, mostly in the United States, because almost all of the Free World synthetic capacity is here. The second effect would be immediately apparent in all the industries supplying the synthetic people.

Will it happen? Most informed observers are only asking "When?"

Trouble seems to be coming in the world rubber marts — and the effect may jolt US synthetic producers out of their narrowed profit margins in a hurry.

Little recognized, but vitally important, is the effect of the Indonesian crisis on its 40% share of the world's natural rubber supply.

The crux of the problem appears to be the Dutch-Indonesian dispute over Dutch properties and estates which the Dutch call "nationalization" and the Indonesians say is "supervision."

A more sophisticated viewpoint is that a complex brew of Indonesian claims to Netherlands New Guinea, Communism, nationalism, and even civil war might trigger an acute world shortage of natural rubber.

Here are the statistics of the situation. Total world rubber consumption is about 3,250,000 long tons of which 1,905,000 tons are natural rubber and 1,345,000 tons are synthetic. The United States consumes approximately 900,000 tons of the synthetic. Most of the remaining synthetic tonnage is consumed in Europe. Indonesia produces about 750,000 tons of the natural

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You have no need to worry about gas storage problems when you use Taylor-Wharton mobile gas transports. Using them provides substantial savings and greater mobility of operations. Oil refining, petrochemical, food processing and electronic companies can make good use of these Taylor-Wharton transports to cut costs and expedite inter-plant haulage. Each tube meets I.C.C.-3A2400 specifications, is completely heat-treated. Transports consists of a group of 2400 p.s.i. seamless steel storage pressure tubes rigidly mounted to a single or double axle model trailer with capacities ranging from 38,500 to 56,250 cu. ft.

More than a Century in Harrisburg 24, Pa.

HARRISBURG STEEL CO.

Division of HARSCO CORPORATION

Check 3923 opposite last page

rubber, or about 40% of the world supply. Should a shortage in natural rubber available develop, it appears that the synthetic facilities in the United States would have to make up the difference. Could they?

Although rubber statistics are changing rapidly today, estimated US annual capacity at end of 1957 was 1,277,500 long tons of GR-S polymer. To this amount should be added the butyl, neoprene, and nitrile rubbers which total another 295,000 long tons. Total is approximately 1,575,000 long tons of synthetic rubber capacity, easily great enough to remove the "pinch" should Indonesia drop out of the world supply picture — either partially or entirely.

Can chemical intermediates be supplied? Butadiene capacity at end of 1957 just about balanced GR-S rubber capacity. Expansion of butadiene production facilities is expected to continue. Much the same is expected of styrene. The other chemicals and materials, carbon black, zinc oxide, emulsifiers could easily be supplied.

Civil War?

Neither the rubber tire industry nor the mechanical rubber goods trade, says the Rubber Manufacturers Association in New York, seems greatly concerned at the moment over an acute shortage of natural rubber. Industry people seem to feel that production of Indonesian rubber is under close control of military authorities anxious to avoid serious trouble that would have an adverse effect on the Indonesian economy.

But civil war is already being talked about in Indonesia, and the country's economic chaos is helping it along. It could well be sparked by the Communists taking over the central government of these 3000 islands. The outer islands might attempt to break free, with Sumatra being the most important of these.

Jakarta newspapers have already told of talks in Sumatra to found a "new Indonesian state." Leaders of more than one rightist political party are involved.

Smuggling . . . and Illegal Exports

The aftermath of the seizures of Dutch enterprises in the islands has been an increase in illegal exports. For some time a substantial share of the Indonesian exports have been shipped from the outlying islands. Mostly small boats have been engaged in the traffic, carrying the products to Singapore for barter. Importance is that the Indonesian central government is thus losing export proceeds needed to support the economy of the island of Java, which is not self-supporting and is Communist-dominated.

Sensitivity of Rubber Exports

"Any political crisis will, of course, have an adverse effect on a nation's economic picture. Should it continue and there be a shortage (of rubber), a price rise will no doubt result," says **Ismail Mohamed Ali,** Minister of the Malayan Federation in Washington. The Netherlands Embassy (perhaps naturally) feels the situation can't help but impede the movement of rubber. A British Embassy spokesman is also alarmist, saying the flow of rubber will certainly be affected.

With the development of some emergency that might shut off export of natural rubber from Indonesia to the outside world, the rubber industry in the United States feels the impact would be quite serious for a time. Rubber prices would advance sharply. As already mentioned, US facilities are more than adequate to meet domestic demands — and much of the world needs — provided manufacturers have time to put their plants in shape.

In background of any trouble that might hinder supplies of natural rubber is fact that any advance in crude rubber to 45c or 50c a pound would stimulate production of a synthetic having all the attributes of natural crude. This product is already developed in pilot plants, latest being Goodyear's $750-thousand unit at Akron for "Natsyn." Yet, because of high costs, the synthetic "natural" rubber is not usually competitive with natural crude at less than 30c a pound.

Synthetic 'Natural' Push

Any development bringing about a sudden change in the industry economics would tend to promote a full commercial production of this new rubber. But there's another problem with the synthetic naturals — lack of isoprene of the necessary purity.

Although substantial quantities of isoprene are available commercially, potential producers of the synthetic natural rubbers don't seem to be satisfied with the material and efforts are being made to find a method of producing ultra-high-purity material. There's little doubt that this will be accomplished in a reasonable length of time, but if a shortage of natural should develop then time might well be the prime consideration.

In the event of a rise in natural crude, it would also be reasonable to expect higher quotations for synthetic products, and at least moderately higher margins for US producers — although the industry might endeavor to hold down increases to moderate proportions in an effort to strengthen their competitive position.

Whatever happens in this latest troubled spot of the world seems to mean increased growth for the US's synthetic industry — and the chemical and petrochemical industries supplying the synthetic rubber plants.

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Copper Fluoborate
Fluoboric Acid
Fluorine Cells
Fluorinating Agents
Frosting Mixtures
Hydrofluoric Acid Anhydrous
Hydrofluoric Acid Aqueous
Hydrofluosilicic Acid
Lead Fluoborate
Metallic Fluoborates
Potassium Bifluoride
Potassium Chromium Fluoride
Potassium Fluoborate
Potassium Fluoride
Potassium Titanium Fluoride
Silico Fluorides
Sodium Fluoborate
Tin Fluoborate
Zinc Fluoborate
Zinc Fluoride

Check 3924 opposite last page

This month, Chemical Business interviews . . .

Morton's New Chemical Company

". . . a good running start"

Of the myriad chemical industry trends which can be observed these days, one of the most prominent is that of consolidation. Companies — some on the fringes and some completely outside the chemical industry — that have been running chemical operations for years as divisions, departments, subsidiaries, or isolated plants, are more than likely now to be wrapping the whole thing up in a single separate company. The latest of these consolidations is the new Morton Chemical Company.

Morton Chemical's new president, **Joseph Rich** explains the move: "The problems of a salt company and a chemical company are not at all similar. Of course we've felt for quite a while that this step was inevitable and when the time came we took it."

On the company's future: "Certainly we're all enthusiastic. The company has an excellent foundation in its present lines, we're moving into some new markets now with new products, we can all see substantial growth ahead. As you know, we are already pretty widely diversified for a company of our size, and have a good running start in the direction we want to go."

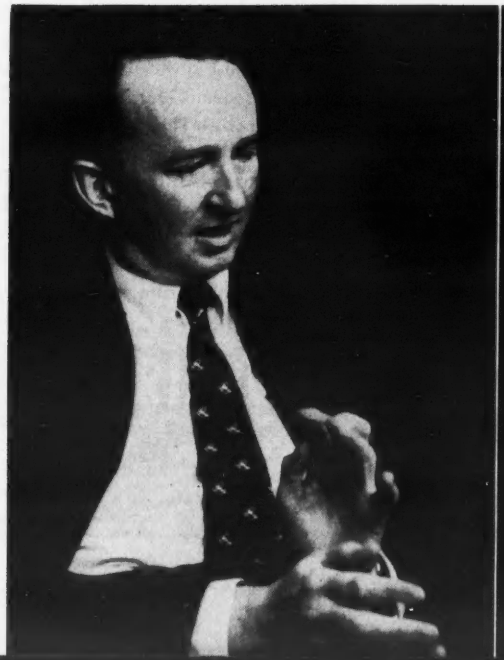
What direction? "Our first job will be to expand and strengthen our present manufacturing centers. At the same time we'd like to initiate new centers and new products. I think, though, that in the foreseeable future we'll tend to limit our diversification to logical steps from our present activities. Still, if we should run into something that looked good . . ."

Morton's entry into the chemical field was unplanned if not accidental. Back in 1930 it bought the old Ruggles and Rademaker company, makers of organic bromides, for the salt resources it controlled. Later on, to guarantee a source for its anti-caking additive for table salt, Morton put up a magnesium carbonate unit on the Ruggles and Rademaker site.

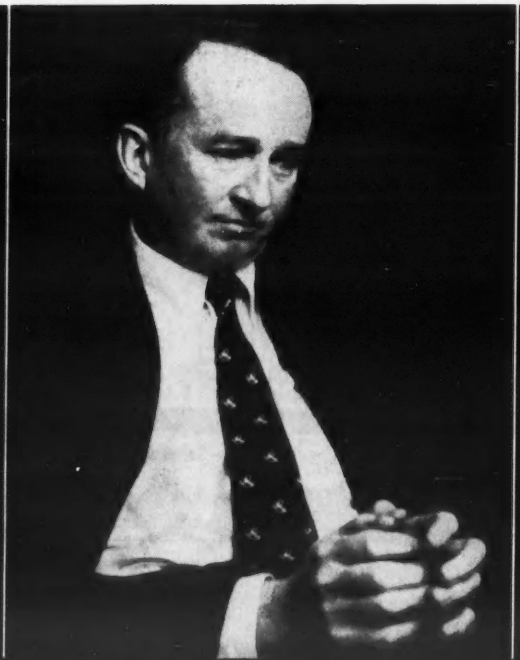
Then in 1947, Morton bought the Miles Salt Company, Weeks Island, La., also for its salt business. But in the deal Morton acquired Miles' wholly-owned subsidiary, Bay Chemical Company, which made hydrochloric acid and salt cake (sodium sulfate) for the southern paper producers. By then, although hardly a volume producer, Morton was squarely in the chemical business. The next move was deliberate.

Morton was beginning to feel the need to diversify and chemicals seemed to be the logical direction. One company that came to its attention was Edwal Labs, which later became Ringwood Chemical Company. Although Edwal was at the time rather under-capitalized, it has a group of excellent scientists and engineers and was considered to have a great deal of potential. Edwal was founded during the depression by two University of Chicago graduates, **Dr. Edmund Lowe**

Morton's Rich: ". . . We're already pretty well diversified and have a good running start in the direction we want to go"



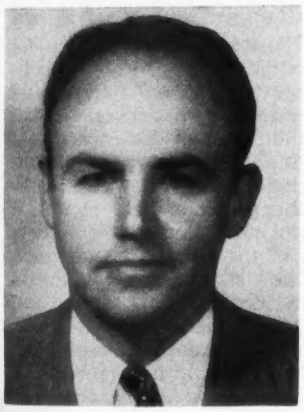
"Our first job will be to strengthen and expand present manufacturing centers"



". . . in the foreseeable future we'll tend to limit our diversification to logical steps from our present activities."

and **Dr. Walter Guthmann,** largely because there were few jobs for new engineers those days and they decided to create their own. The partnership was formed in 1932 and Edwal was incorporated in 1934.

From the beginning, Edwal's production was mostly photographic chemicals and various specialty materials. Probably typical of the company's early business was a material supplied to the Chicago World's Fair. One of Mike Todd's dancers required "wings" which would burn in a rather spectacular manner when ignited and Edwal undertook to supply them. The wing business, as well as such things as artificial volcano smoke for Frank Buck's Monkey Mountain, provided

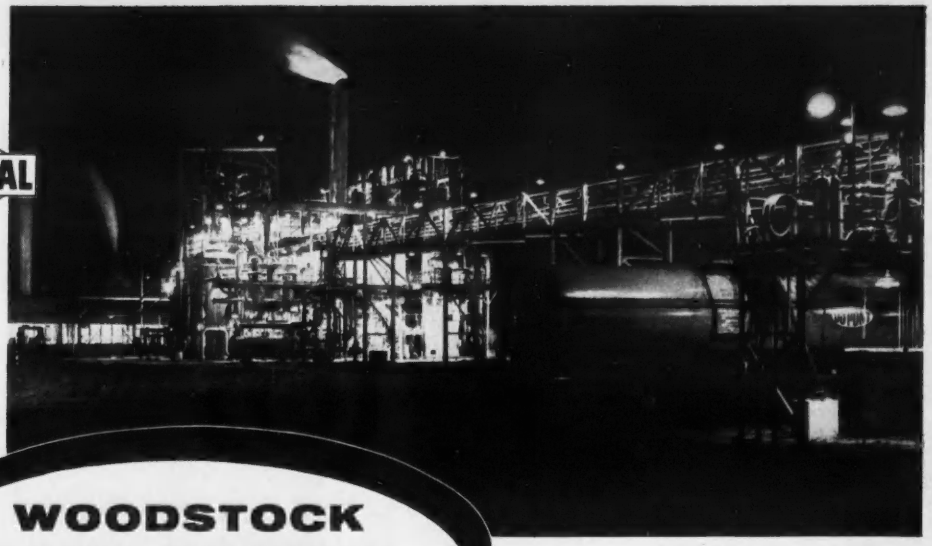


Morton v-p Dr. Robert Frank

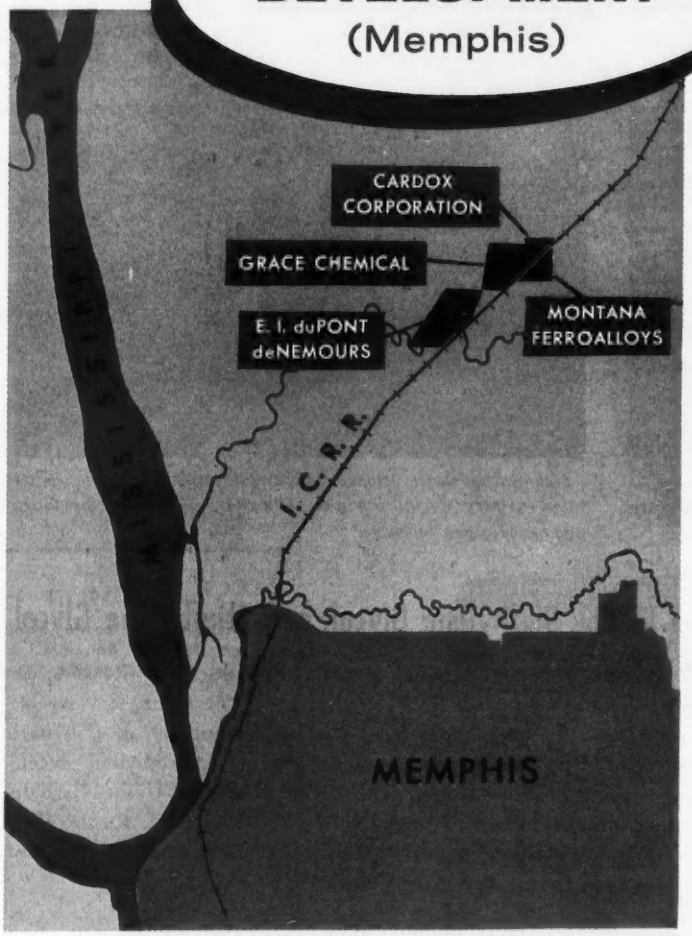
quite a bit of activity for a couple of years. Later on they made the ink for the first ball-point pen.

By 1951, when Morton bought controlling interest in the company, it had turned to more conventional — if more prosaic — products. The line consisted, and still does, of photographic chemicals used primarily in reproduction papers, as well as fine organic chemicals for the cosmetics, textile dye, and pharmaceutical fields. The Ringwood plant also manufactures a line of agricultural chemicals which includes a line of fungicides (Panogen) and a soil and grain fumigant (Larva-

ILLINOIS CENTRAL



WOODSTOCK DEVELOPMENT
(Memphis)



... a stimulating industrial climate for chemical plants

There's ample room for more chemical plants in this open area 11 miles north of downtown Memphis. This rapidly growing development began in 1950 with the sodium cyanide, hydrogen peroxide and hydrocyanic acid plant of duPont. Then came Grace Chemical's plant producing anhydrous ammonia, nitrogen fertilizer solution, urea fertilizer compound, urea feed grade and carbon dioxide, and Cardox Corporation's plant next door utilizing Grace's carbon dioxide. Here also is Montana Ferroalloy's ferrochrome plant.

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ILLINOIS CENTRAL
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Check 3925 opposite last page

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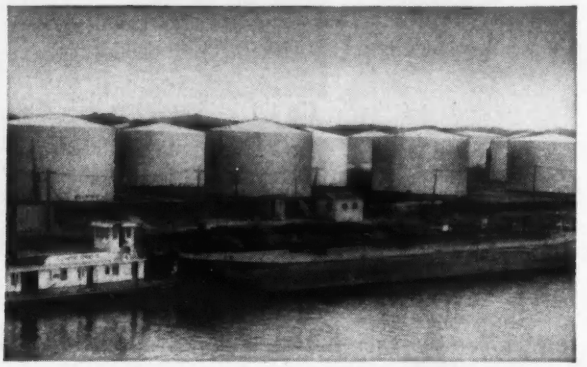

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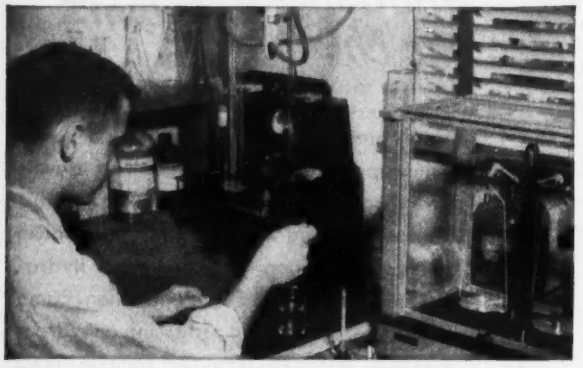

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In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal.

Check 3926 opposite last page

cide), both marketed by Morton's Panogen Company.

The Weeks Island operation still makes large quantities of salt cake and hydrochloric acid, and is planning to have its new activated clay plant on stream by June.

The Manistee, Michigan, plant produces inorganic bromides, basic magnesium carbonate, and magnesium oxide which is sold primarily to the steel and the drug industries. The company has high hopes of expanding these operations in the near future.

Adds New Line

Previously the sales of the group roughly divided into three areas — salt cake to the paper people, the fine organic line, and the agricultural chemical line. There's a fourth now which might well lead the company further into the reaches of diversification than any of the others — a line of latices, primarily for floor waxes now, although the coatings field is a logical next step. They've been on the market little more than six months, but the reception has been good and Morton looks for the business to keep growing.

Although the reorganization has required some shifting of management gears, the management is essentially the same. Rich (a non-engineer, with experience at both Simoniz and the investment firm of Bacon, Whipple and Co.) had been a Morton v-p in charge of the Chemical Division. **Dr. Robert Frank,** the new v-p, continues to head up the Morton research lab at Woodstock, Ill. Sales Manager **Tom Dabovich** had held the same job with the chemical division. The only new faces among top management are those of commercial development manager **John G. Collins,** previously coordinator of chemicals for National Lead, and Controller **C. J. Ehrenkrook** who held the same post with Nuclear Instrument and Chemical.

OUTLOOK FOR RUBBER

WILLIAM R. WHITE
Market Analyst, Hornblower & Weeks

Political and economic turmoil in Indonesia no longer can have the disturbing effect on operations of US rubber tire makers that it could have had two decades or more ago. For one thing, a downtrend in shipments of natural rubber from the Far East, which has been evident for some time, may be accentuated by the bitter struggle between the Dutch and Native elements and tend to create an even broader market demand for synthetic materials, thereby stiffening the general price structure.

This development that seemingly threatens a major source for a vital raw material calls attention to a remarkable industrial transformation that has taken place in the last decade. In fact, it explains the relative calm with which rubber fabricators throughout the world have viewed the Indonesian crisis. Construction of enormous plants engaged in converting hydrocarbons and other essential petroleum derivatives into a substitute for natural rubber has freed American manufacturers from the vicissitudes of threatened inventory losses arising from unfavorable weather or other conditions in rubber growing areas.

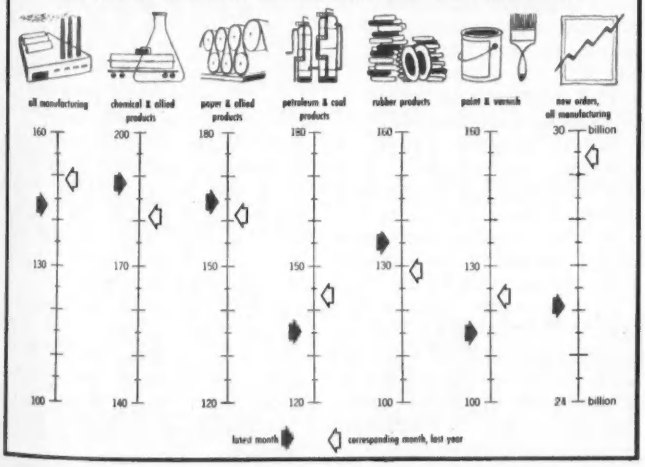
Although fabricators of rubber products would be loath to see a complete stoppage of Javan shipments, it is generally agreed that facilities for producing synthetics could be made readily available to take up the slack in output. Industry executives point out that this would boost prices of natural rubber and provide an incentive for enlarging capacity of newer types of synthetics.

For consumers preferring synthetics, no problem would be caused by inadequate supplies of natural rubber, while for those in a position to use either natural or synthetic materials, it is believed there would be little threat of a serious shortage. Fabricators depending on natural rubber for its special attributes might well be confronted

To page 83

chemical business INDEX

Production indices, from latest available Federal Reserve Board figures, based on 1947-49=100. New Orders, All Manufacturing, (last column) from latest available Department of Commerce data.



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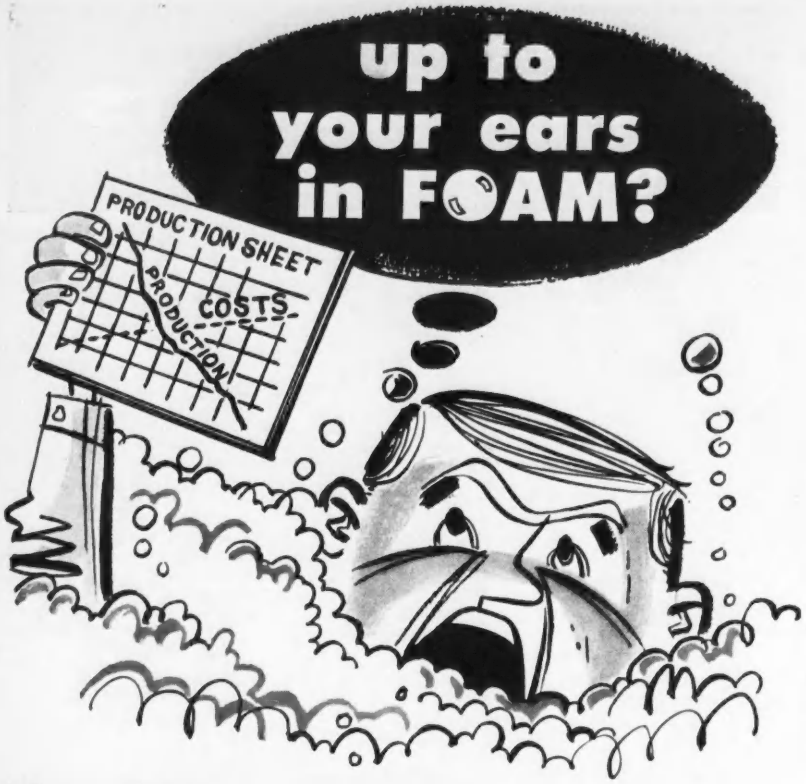

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Check 3928 opposite last page

CP Our Growing Industry

Chemical Expansion for 1958-59 to Hit New Peak

If any credence is to be lent to the harbingers of economic ill-fortune, there's little evidence of it in the building plans of the chemical industry. According to the latest proposed expansion figures released by the Manufacturing Chemists' Association, the money to be spent for new chemical capacity during 1958-59 will total $2.54 billion — somewhat higher than the figures estimated for the period 1957-58. And although some observers have described the industry as having reached a "plateau," the figures indicate that the chemical industry has maintained its position of growth leader among all major American industries.

These estimates were formulated before the recent defense budget boosts, leaving a better-than-even bet that the expansions might even exceed these plans. Since roughly 20 percent of each missile dollar goes for propulsion (both fuels and rocket engines), any increase in missile spending — and indications are that there may be quite a bit more — can represent a considerable boost in chemical spending. Application of the rule-of-thumb, a dollar in new business equals a dollar in new facilities, indicates the possibility of additional new capacity planning.

When making the report public, **Gen John E. Hull,** MCA president, commented on the US economy: "There are few industries not dependent to a large degree on the products of chemistry. Therefore, the fact that this vital industry is demonstrating a continuing active confidence in its own future implies a confidence in the future of our economy and, more important, perhaps, an abiding confidence in the future of our nation as a whole."

The expansion covered in the survey includes 322 projects now underway and 119 projects scheduled for ground-breaking in the near future with completion before 1960. The projects now under construction have a total value of $1.83 billion.

Last year saw the completion of 309 projects in the industry, with a total value of $1.3 billion — the twelfth consecutive year of chemical expansion in excess of a billion dollars.

The state of Texas, second in total chemical production (behind New Jersey) again placed first in expansion with $864.5 million. Louisiana runs second with a planned $494 million while West Virginia places third with a proposed $278 million investment. Ohio plans $228 million; California, $188 million; New Jersey, $155 million. Florida will add $144 million in new capacity.

Barrow, Omaha "World-Herald"

"No Rest For Weary Willie"

In terms of product classifications, general organics tops the field with a proposed expansion of over $987 million. Inorganics follow with $710.5. Third place is occupied by metals (including titanium, zirconium, boron, beryllium, etc., but not such things as aluminum, copper or magnesium) with a planned expenditure of almost $615 million.

Rubber Outlook

From page 81

with a problem for a time. The market for rubber is divided approximately evenly three ways among 1) consumers who find synthetic supplies more adaptable, 2) those who base their requirements on price rather than types of rubber and finally, 3) those who require the tree-grown article.

As a result of substitution of chemicals as a basic raw material, the rubber tire industry has attained a measure of investment standing never possible while earnings were subject to such hectic swings as in the days before World War II. Consequences of dramatic price fluctuations seem incredible now, but in the 1920s and 1930s fluctuations of as much as $1 a pound in crude rubber within a comparatively short period are remembered. When it is realized that large manufacturers normally carried millions of pounds of raw materials much of the time, the effect of violent swings in inventory values on earnings and balance sheets often proved disturbing and posed severe problems for management. Thus, the record of the last twenty years demonstrates the immense benefits of stabilization in the industry stemming from substitution of a chemical raw material immune to wide price swings. From an investment viewpoint this progress has been reflected in price appreciation of representative common stocks as much as twenty times their mean prices of 1939.

Because the investment community has come to recognize the significance of changed conditions and feels that earning power is not likely to be distorted by a sudden disturbance in the Far East or other areas, stock buyers are willing to place higher appraisals on earning power than otherwise would have been considered prudent — especially in a period of unsettled market conditions such as have been experienced recently. This partly explains

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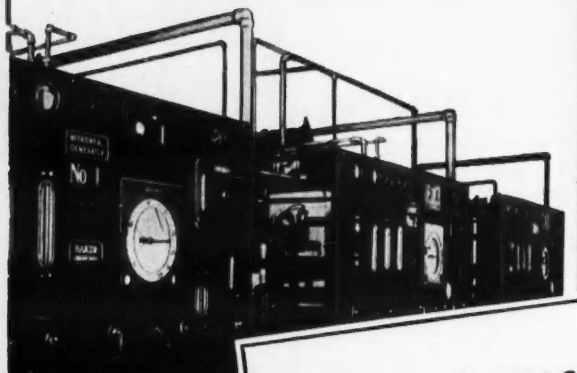

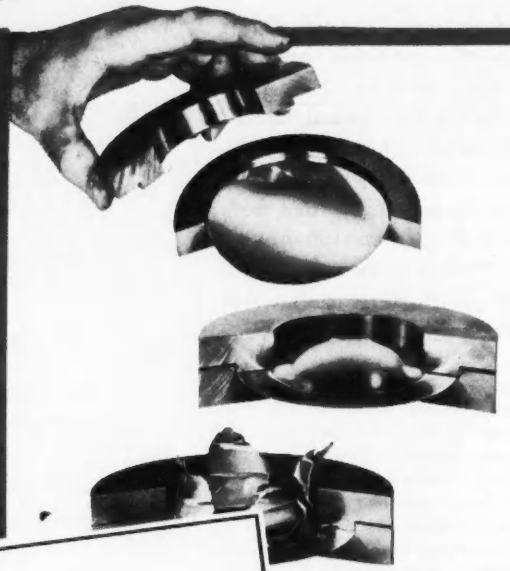

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Check 3930 opposite last page

CHEMICAL BUSINESS

why to some diehards of a bygone era rubber stocks have seemed fully priced around recently prevailing levels.

When common stocks persistently attract investment demand at fourteen to sixteen times per share earnings — whether for last year or for an average of the last five or ten years — there must be a reason for such popularity. The reason in the rubber group is a confidence, supported by records through the years, that stability of earnings can be depended upon by elimination of pricing problems of natural rubber in bygone years, as well as by the promise of steady expansion based on population growth.

Earnings of major tire producers held up last year rather well, making a better showing than many other groups, and show promise of a favorable comparison this year, not only with 1957 but with average results for the last five years. The Big Four — consisting of Firestone, Goodrich, Goodyear and US Rubber — have maintained conservative dividend policies, and returns at recent prices are far below average except possibly in the case of US Rubber, which customarily has paid out a larger share of earnings than the other three. For a long term participation in a basic industry, these issues deserve consideration.

For further information, write Hornblower & Weeks, 40 Wall St., New York 5, N. Y., or check 3931 opp. last page.

Annual meeting of the Commercial Chemical Development Association, being held March 27th at the Statler Hotel in New York, will have as its theme, "The Commercial Impact of Synthetic Rubber." Covered will be such subjects as "European Developments in Rubber," "Growth Forecasts for Rubber and the Impact of Other Materials," and "Growth Prospects for Rubber Raw Materials and Compounding Agents."

Spotlight on people

R. M. Jones is appointed director of technical service for Allied Chemical's Nitrogen Division. Jones succeeds **E. W. Harvey,** who retired the first of the year. In addition to his new duties, Jones will continue as Nitrogen Division's manager of product development. And at Allied's Solvay Process Division . . . **Wilbur H. Brumfield** and **Cortez P. Hackett** are made vice presidents.

Three management changes in the chemical sales division of Shell Chemical make **Thomas F. Mika** new assistant to sales manager, New York; **William A. McCormick** new assistant to sales development manager, New York; and **John R. Brady Jr.** new district manager, St. Louis.

Rolland O. Baum is elected executive vice president and general manager of Tennessee Products & Chemical.

Roach

New vice president in charge of production and development for Hodag Chemical is **John Roach.** Roach's new responsibilities will include the development of new equipment, new plant processes, and new products.

G. Wesley Joithe and **Ernst H. Kastning** have been appointed treasurer and technical director respectively of the Reheis Company.

American Cyanamid appoints **Ben F. Melucci** commercial development manager of industrial chemicals division.

Taylor

Bert S. Taylor, v-p of Food Machinery and Chemical's Organic Chemicals Division, is named director of marketing and purchasing. Taylor will be responsible for all sales and purchasing activities for division.

Three appointments in the chemical sales division of Du Pont's polychemicals department create new positions for **Dr. Myers F. Gribbins, Jac O. Ullman,** and **Dr. Frank G. Keenen.** Dr Gribbins is named manager of ammonia products section. Ullman replaces Gribbins in his former position of assistant sales manager of nitrogen products section. And Dr. Keenen moves up to post of associate laboratory director for department's sales service laboratory at Chestnut Run, Delaware.

B. B. Turner, president of Ethyl Corporation, is designated chief executive officer for company.

Hartley W. Voigt is named vice president of Blockson Chemical Division, Olin Mathieson. Voigt has been with the company for seven years and has held the position of divisional comptroller for the past three.

Voigt

Jefferson Chemical announces the creation of two product manager posts. Named to hold these new positions are **Joseph K. Goerner** as manager, specialty products; and **Ben C. Hayton,** as manager, glycol products.

Audley Clarke, secretary and administrative assistant to the president, is elected a vice president of Chemical Products Corporation.

James F. Eversole is appointed vice president of Union Carbide Development, division of Union Carbide Corporation. **Frederick H. Roberts** will fill Eversole's previous position of vice president-research of Bakelite Company.

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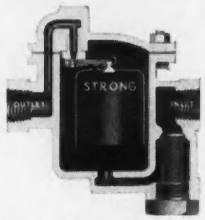
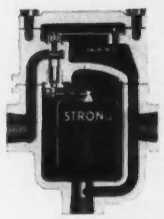


140S, 141S, 142S (semi-steel): same as 140-142, with a built-in strainer for removing foreign matter.



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643, 644, 645, 646 (cast steel): pressure-temperature limit — 600 psi at 800°F; capacities to 42,800 lbs/hour

1543, 1544, 1545, 1546 (forged SAE 4130 Chrome-Moly Steel): pressure-temperature limit — 1500 psi at 950°F; capacities to 42,800 lbs/hour

642 (forged steel): pressure-temperature limit — 400 psi at 850°F; capacities to 2665 lbs/hour (not illustrated)

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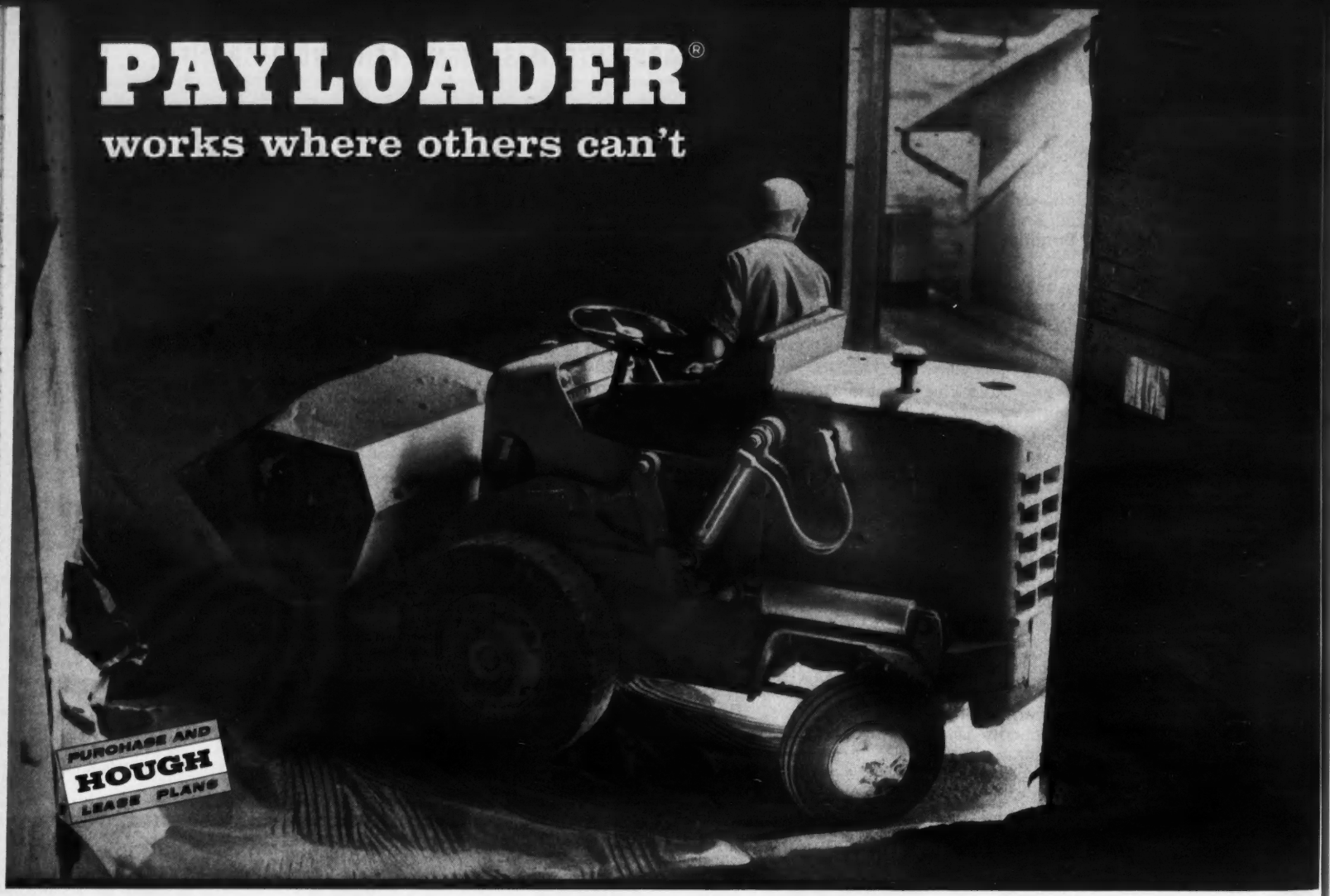

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Management School

From page 30

cussions. In fact, there has been some good-natured "grousing" to the effect that "free" afternoons "aren't really free." Special evening sessions related to the day's subject matter are occasionally scheduled, and dinner speakers also treat topics pertinent to the daytime discussions.

Spirit of 'Retreat'

Participants remain in residence at Excelsior Springs throughout the three weeks allotted for each class; only a few members during the 1957 session returned to near-by homes on weekends, or for emergencies deriving from business or personal matters.

Each man's room is his own private castle; each student is supplied with all books necessary for assigned readings. In addition, a "community" library holds several copies of all auxiliary readings. Local recreation consists largely of walking, bowling and, weather permitting, an occasional round of golf.

The spirit of "retreat" and also of camaraderie among the participants is high, and is considered by the company a decided plus-factor in the success of the school. The intent of each participant obviously is serious toward deriving as much individual benefit as possible from the intensive study required of him. Men are gathered from various locations of the company, and in many cases, because of divergent specialties, there has been little prior opportunity for personal meeting. Here, we have noticed, men with the common ground of years spent in the employ of the same company become better acquainted with ease, learn to appreciate the many different qualifications necessary to form an industrial whole, and through direct contact come to know better the personalities of fellow

For more information on product at left, specify 3934 . . . see information request blank opposite last page.

Maintenance and Steam Traps

. . . there's a relationship that goes far beyond trap maintenance alone

Good traps and good trapping have a greater effect on your maintenance costs than does trap maintenance itself. By that we mean that the right traps, properly selected and installed, and with the benefits of a preventive maintenance program, will save far more maintenance dollars than they will cost.

Under the pressure of spiralling maintenance costs, this thought becomes mighty important. Let's take a look at what it involves:

Proper Selection of Steam Traps

1. Be sure it's the right type of trap.
2. Be sure it's sized right and is for the correct operating pressure.
3. Be sure it's first rate in design and construction.

Proper Installation of Steam Traps

1. Install them so they are accessible for inspection and maintenance.
2. Install a test valve.
3. Use a union or unions.
4. Use a shutoff valve or valves.
5. Use a strainer ahead of the trap if dirt conditions are bad.
6. Use a by-pass only where continuity of service is imperative.
7. Standardize inlet and outlet connections.

Preventive Maintenance Program

1. Test trap regularly for proper operation. (Trap size, operating pressure and importance determine frequency.)
2. Inspect internal mechanism at least once a year.

You Get Indirect Benefits As Well

The direct benefits of the plan outlined are pretty obvious — good traps, properly selected, require less maintenance . . . testing and inspection prevents troubles that lead to maintenance.

However, this plan provides indirect benefits which reduce maintenance in other parts of the plant as well:

Good traps save steam and reduce the load (and consequently maintenance) on fuel handling and burning equipment and on ash handling equipment.

Good traps protect the system by eliminating water hammer and preventing the damage it can do.

Good traps discharge carbon dioxide before it can go into solution to form corrosive carbonic acid —less corrosion, less maintenance.

Good traps increase production to reduce the length of time equipment must operate or reduce the amount of equipment needed . . . either way maintenance is reduced.

How to Go About It (The Sales Pitch)

We admit we're prejudiced, but we don't think there is any better way to select steam traps than with the help of the 44 page Armstrong Steam Trap Book. Here in a single source is specific data on the selection and sizing of traps, how to install them for best results, and how to maintain them most economically.

The Steam Trap Book will also give you full information on the design and construction of Armstrong Inverted Bucket Steam Traps that offer these important maintenance-reducing advantages:

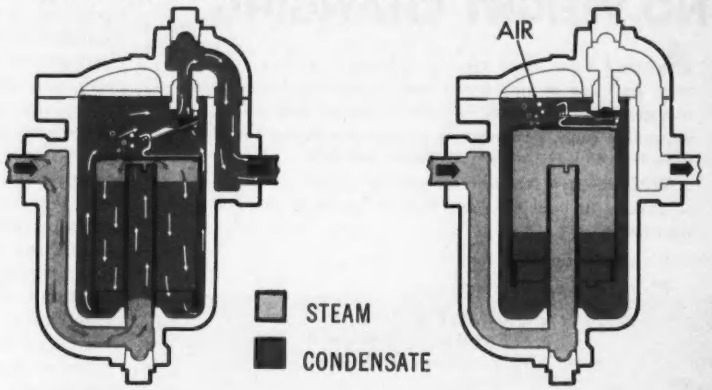
1. Armstrong Traps are dependable.
2. Armstrong Traps require no adjustments — go from full load to zero load automatically.
3. Armstrong Traps are self-scrubbing—ordinary dirt conditions can't hurt them.
4. Armstrong Traps have long-life parts — valve and seat are heat treated chrome steel — lever assembly and bucket are stainless steel.
5. Armstrong Traps have water sealed valves to minimize wire drawing and erosion.

Ask for your copy of the Steam Trap Book—there is no obligation. Then test Armstrong Trapping. If you are not completely satisfied with the results, you can return the traps for a full refund of the purchase price. You can't lose much that way. Call your local Armstrong Representative or Distributor, or write

Armstrong Machine Works
8803 Maple Street
Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

HERE'S THE STEAM TRAP DESIGN THAT CAN REDUCE YOUR MAINTENANCE PROBLEMS



Trap open. Condensate entering trap has caused bucket to lose buoyancy. Weight of bucket times leverage pulls valve open. Air is discharged along with condensate.

Trap closed. Steam has floated inverted bucket; valve is held tightly closed by system pressure. Air entering trap passes through bucket vent and accumulates at top of trap.

Check 3935 opposite last page

managers whose work affects and ties in with their own.

Considered Practical Program

The program was organized and is administered in its broad aspects by the vice president for personnel. Management personnel of varied backgrounds have contributed their talents to planning and carrying out the practical working of the school in keeping with its underlying philosophy and aims.

Creation and activation of the course have been the responsibility of A. J. Pastene, former manager of Monsanto's key employee development program and at present consultant for the project. E. W. Burr, manager of Monsanto's personnel development program, also has been closely associated with the over-all facets of the school from the beginning.

Harry M. Balthaser, who served previously as a divisional director of sales, is director of the program for the 1958 session.

Elmer Wheeler, on leave of absence from his position as assistant director of Monsanto's Medical Department, is his assistant.

The 1957 session was directed by William M. Russell, who, after a leave of absence for this purpose from divisional duties, has resumed the position of director of sales for the company's Organic Chemicals Division. Horace J. Tubbesing, former assistant director, is now general offices personnel manager.

That the company is enthusiastically supporting the "second semester" in the continuation of advanced training for its key personnel is indication enough of the judgment pronounced on the practicality of such a program. Not only might the school be described as "capital investment"; the concept of research is equally apropos. We are experimenting in a reasonable fashion and at a measured pace, and we are carefully weighing and scrutinizing all we learn. We believe we are charting our course soundly, and hopefully look forward to benefits, both to the company and to the individuals who attend the school, for many years to come. ■

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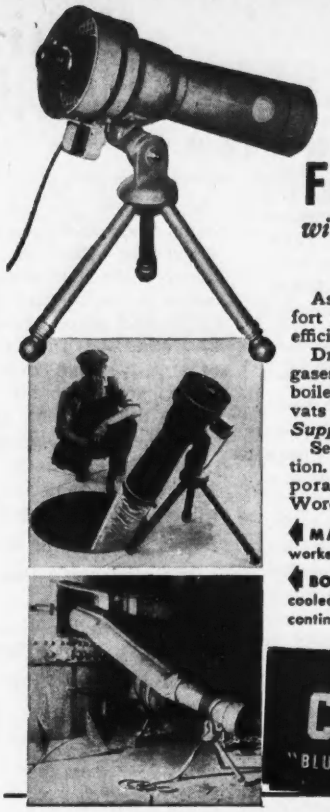

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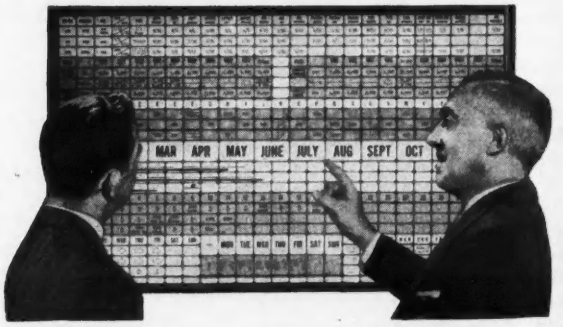

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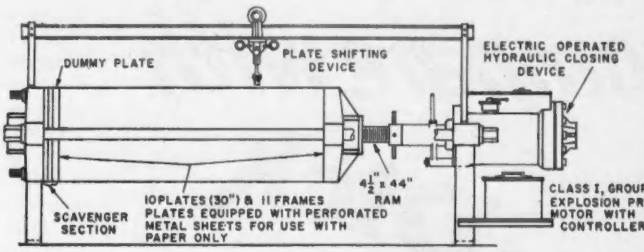
Check 3939 opposite last page

When everything else seemed to fail to solve the difficult filtration problem at Canadian General Electric's chemical works, the old reliable 'workhorse' of the filter family came through. Equipped with an efficient scavenger section and modern labor-saving devices, the new plate-and-frame press . . .

stops filtration bottleneck, boosts output of resin varnishes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10 PLATES (30") & 11 FRAMES PLATES EQUIPPED WITH PERFORATED METAL SHEETS FOR USE WITH PAPER ONLY
4½" x 44" RAM
CLASS I, GROUP D EXPLOSION PROOF MOTOR WITH CONTROLLER

Drawing shows location of scavenger section of plate-and-frame filter press

TED F. MEINHOLD, Associate Editor
With **W. E. NOBLE,** Manager
Engineering Chemical Materials
Canadian General Electric Company, Toronto, Ontario

Filter press is designed for one-man operation, contains many labor-saving devices

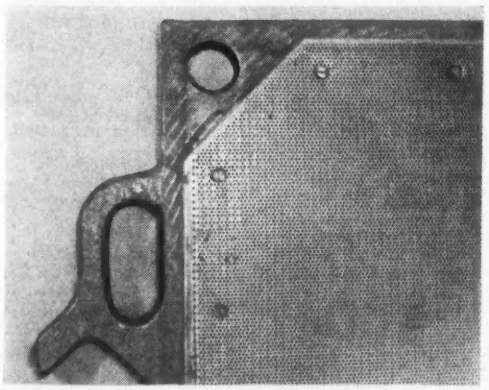
Problem: A filtration bottleneck developed when Canadian General Electric Company boosted its production in 1955 and started making a greater variety of resin varnishes at their Toronto, Canada, Chemical Works. Output from each of the four kettles ranged from 360 to 3500 US gal per batch, which was handled by four conventional horizontal-plate filters.

Due to the large number of incompatible products and varying batch sizes, the filters had to be shut down, opened and cleaned frequently. When cleaning the units, scavenging presented a big problem. To do the job right required excess labor and dragged out the filter cycle considerably.

The situation became intolerable whenever difficult filtering problems were encountered, i.e., gelled particles, haze, etc. Although additional help could be hired to alleviate the labor problem, this would not shorten the filter cycle, which had to be kept short to keep up with kettle production cycles.

Viscosity of the thick, sticky products is about 5000 cp at a temperature of 77°F. Solids content ranges from 50 to 70 percent in aliphatic or aromatic solvents of low toxicity. Filtration is carried out at considerably higher temperatures and often at much higher solids content.

Solution: After making a thorough analysis of the situation, Company decided to purchase a plate-and-frame filter to augment the existing battery of filters. However, investigation revealed that scavenging systems on current models were not adequate for varnish operations, since only the frames are scavenged and some product is always left between the filter medium and the plate.



Plates are covered with perforated metal sheets to permit use of paper filter media

To solve this problem, Company engineers designed their own scavenging system. Filtration experts from General Filtration and Engineering Limited of Toronto were consulted and they agreed that the system was feasible. The design was then submitted to a filter manufacturer to see if it could be incorporated in their standard filter press.

The unit was delivered and installed in late 1956, and went into full production in January 1957. The filter press is designed to permit the varnish to be filtered in the main section of the press — the same as in conventional units. When filtration of a batch is completed, the filter cake is blown, and *all* varnish remaining in the frames of the main section is forced into the scavenger chamber located at the far end of the press where it is immediately filtered and the cake blown dry. Filtered varnish left on all plates behind the papers is also blown out through a special port arrangement as finished product, without breaking the filter paper.

To next page

GOT HOT WATER?
nothing can compare with
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HOT WATER HEATERS

Check 3940 opposite last page

From preceding page

The scavenger chamber contains two head plates and one frame. It is actually a separate filter press within the press. This design permits compatible varnish resins to be filtered in sequence without the necessity of opening or cleaning the press to avoid contamination of the products. Secondly, the press may also be flushed with solvent and used again without opening.

The filter press is a 30-inch 11-plate unit designed for one-man operation. An electric-operated hydraulic ram closes or opens the press automatically in a matter of seconds. The device is a self-contained unit mounted right on the press. The press is also equipped with a plate shifting device that enables one man to easily move the plates and frames along a small trolley mounted on top of the press.

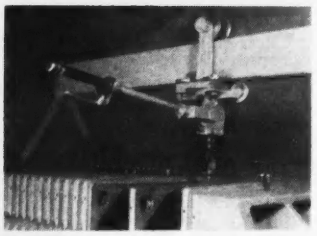

Plate shifting device permits plates (and frames) to be moved easily

The plates of the press are covered with perforated metal sheets. These are mounted flush with the packing surface of the plate for use with paper filter media. A tight fit is made between the perforated sheet and the ledge in the plate to assure that the filter paper will not break in use.

Disposable Paper

Disposable paper, made by The Eaton-Dikeman Company, is used as filter media. The papers are cut and punched to size, making them easy to install and replace. Use of filter cloth was found to be impractical in filtering varnishes of this type. Filter cloths were very messy, awkward, and expensive procedure. In any case, product clarity would have necessitated the use of a

To page 92

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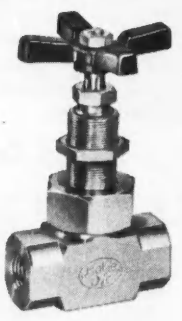

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Check 3943 opposite last page

NEW SOLUTIONS

From page 90

cover filter paper over the cloth.

Results: Filtering has ceased to be a problem. Engineers say that this is the first filter they have seen that is capable of meeting the tough requirements of varnish filtering operations.

The unit now handles over 40% of the total varnish production. Filtration batches range from 1200 to 4500 gal. When batches are of a compatible nature, press can process in succession anywhere from two of the large size batches to 8-10 of the small ones without opening the press for cleaning. Common throughput per setting of paper is 10,000 gal.

The filtration time cycle has been reduced considerably. Throughput per hour on the press is about six times greater than on the old filters. This is accounted for by the larger working area (not quite double), higher working pressures (about twice as high), and the drastic reduction in downtime.

When cleaning does become necessary, and although no actual figures are available, it is estimated that one man can scavenge and clean the press and ready it for the next filtration in about ½ to ¾ hour. The scavenger system not only removes all the liquid in the press and scavenger sections, it also gives a reasonably dry cake.

(Type EHCL filter press was manufactured by D. R. Sperry & Company, Batavia, Illinois.)

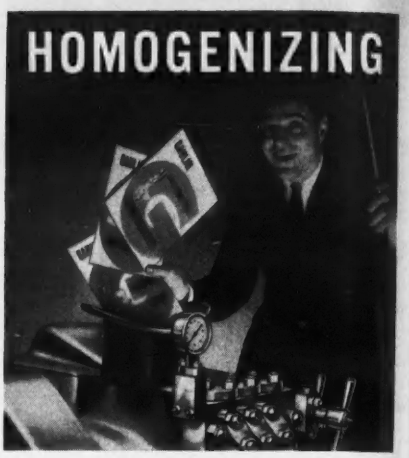
Check 3944 opposite last page.

Tantalum thwarts action of hot wet chlorine, hot brine

Current leakage factor in severely corrosive service

Problem: Accurate metering of brine feed to Hooker diaphragm cells used for chlorine and caustic soda production is an important factor in maintaining economical and efficient cell operation.

Choice of a suitable orifice



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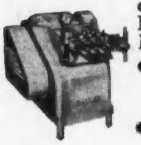

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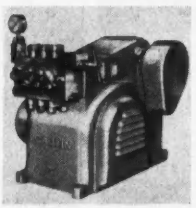


Homogenizer Bulletin H-55
Sub-Micron Disperser Bulletin SMD-55

Colloid Mill Bulletin C-57
Laboratory Homogenizer Bulletin LH-55

Gaulin TRADE MARK
MANTON Gaulin MANUFACTURING CO., INC. EVERETT, MASS.

Manton-Gaulin Manufacturing Co., Inc.
55 Garden Street, Everett 49, Mass.
World's largest manufacturers of high pressure pumps, homogenizers and colloid mills.

Check 3945 opposite last page

material is complicated by three factors. First, feed brine consists of a hot (70°C) saturated solution of sodium chloride containing up to 100-ppm NaOH and 600 ppm of Na_2CO_3. Second, at least a portion of orifice is continually exposed to an atmosphere of hot wet chlorine gas. Finally, although brine feed assembly used tends to reduce current leakage by breaking up brine feed stream, some leakage does occur and can cause electrolytic corrosion.

One non-metallic product was found to be an unsatisfactory orifice material due to susceptibility to attack by caustic in brine feed. Corrosion-resistant alloys tried were attacked by action of wet chlorine and electrolysis.

Popular Cell

Hooker S-type diaphragm cells presently account for over 35% of all chlorine and caustic soda production in the United States. This popularity is attributed to high efficiency combined with over-all simplicity of design. Method of brine feed is an important aspect of this simplicity. By use of precisely dimensioned orifices at each cell it is possible to feed brine from a central constant-level tank. It is, therefore, essential to brine feed rate that the orifices maintain a constant diameter opening even after long periods of use.

Solution: Several years ago Hooker adopted orifices fabricated from extruded tantalum for critical brine feed assembly.

Results: Accurate extruded diameters possible with tantalum minimize variation in feed rates between cells. Severe corrosive conditions; hot brine, hot wet chlorine, and current leakage, have had no adverse effect on orifices that have been in service several years. No noticeable wear has taken place and brine feed rate remains constant. Cell efficiency is maintained.

(Tantalum orifices were supplied by Chemical Equipment Div., Fansteel Metallurgical Corp., North Chicago, Ill.)

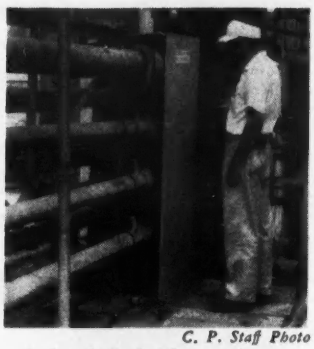
Check 3946 opposite last page.

Glass heat exchangers handle corrosive H_2SO_4 easily, efficiently

Operate around-the-clock 7 days a week

Heating or cooling highly corrosive sulfuric acid presents no problem at Rayonier Incorporated, Jesup, Georgia, thanks to Pyrex brand glass heat exchangers. The units have handled the difficult material on an around-the-clock basis, seven days a week, without trouble.

Built in 1954, the plant produces purified chemical cellulose from wood pulp. More than 7000 trees per day are processed in the huge mill. The finished product is in great demand in many industries, including textiles, tires, plastics, and others.



C. P. Staff Photo

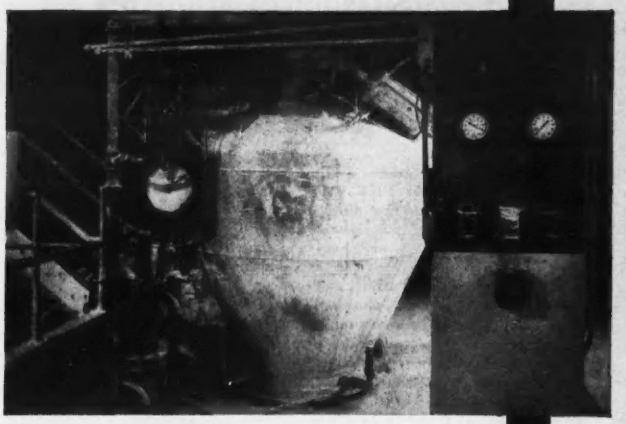
Jacketed 5" glass heat exchanger cools 10-N sulfuric acid at rate of 50-60 gpm

In the pulp bleaching operation, 5" jacketed glass shell-and-tube heat exchangers are used to cool 50-60 gpm 10 normal sulfuric acid (pH less than 1) from 180°F down to 120°F. Water is used as the cooling medium, flowing countercurrent to the acid.

Seven normal (pH less than 1) sulfuric acid in the plant's tall oil operation is heated from 60° to 200°F by means of a 7-pass 3" jacketed glass heat exchanger. Flow rate of acid is about 5 gpm. Hot water, at 200°F, flows countercurrent at 10-20 gpm.

In both applications, the acid comes in contact with nothing but the corrosion-resistant glass and Teflon gaskets, making maintenance

Difficult Bulk Handling Job



...but well-handled by the Robinson Air-Activated Conveyor

Product... abrasive chemical, ¼" to fine dust
Temperature... 660° F.

This Robinson Air-Activated Conveyor is installed in the plant of a well-known chemical company where it is conveying the hot chemical noted above... a job on which other means of handling, including pneumatic, either failed or proved inadequate.

Robinson operations can be made fully automatic and closely controlled by precise instrumentation.

The Robinson System—completely pneumatic, with gravity feed—offers several outstanding advantages for handling fine granular or dry powdered materials into, through and from the plant.

1 . . . **products are handled gently; the mixture is 'fluidized'; particles are floated rather than blasted through the conveyor.**

2 . . . **only low volume of air is required; the average is less than 1 cubic foot of free air per pound of material conveyed.**

3 . . . **maintenance costs are exceptionally low; no moving parts such as motors, screws, shafts and bearings to require maintenance.**

The Robinson Air-Activated Conveyor may be just what you need for pneumatically handling the materials at your plant. Investigate its possibilities. We can point to many successful installations. Write us in detail about your problem.

ROBINSON Air-Activated **CONVEYOR SYSTEMS**

A Division of Morse Boulger Destructor Co.

DEPARTMENT T, 80 FIFTH AVENUE • NEW YORK 11, N. Y.

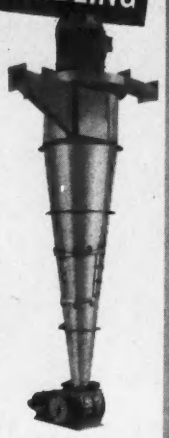
Representatives in Principal Cities

Check 3947 opposite last page

Modern AIR CONVEYING for BULK MATERIALS HANDLING

SPROUT-WALDRON

PNEU-VAC



Modernize for greater savings with a Sprout-Waldron PNEU-VAC Pneumatic Materials Handling System. It draws granular, pulverized, and flaky materials by air anywhere you can run a pipe. The unit can be made to cool, to heat, to aerate, to dry.

Pneu-Vac is self-cleaning, does not produce dust, prevents infestation and product intercontamination, saves space, increases production, provides greater safety and better working conditions.

Sprout-Waldron also offers complete lines of the most advanced screw, belt, and drag conveyors . . . bucket elevators . . . and rotary vane feeders. Write for details.

Write for Bulletin 18-D.

IN/495

SPROUT-WALDRON

Manufacturing Engineers Since 1866

LOGAN STREET • MUNCY, PA.

EQUIPMENT FOR SIZE REDUCTION • MIXING & BLENDING • BULK MATERIALS HANDLING • PELLETING & CUBING • PRODUCT CLASSIFICATION

Check 3948 opposite last page

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A new and thoroughly up to date compilation of chemical tables covering the physical and thermodynamic properties of inorganic and organic compounds. Contains much data not found in other handbooks. The material is arranged in six celluloid tabbed indexes and the manual contains 320 pages. In handy pocket size, loose leaf edition. *Celluloid Tabled Index.*

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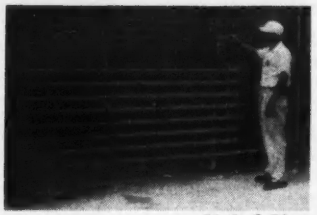
Check 3949 opposite last page

NEW SOLUTIONS

negligible. The smoothness of the glass also provides resistance to buildup of scale and algae deposits, resulting in constant high rate of heat transfer.

Advantages of the glass heat exchangers were realized from the very beginning. The unit's light weight made installation easy and economical. Two men can handle a unit without cranes or hoists. Mounting brackets furnished with each exchanger are the only supporting framework needed.



CP Staff Photo

Seven-pass, 3" glass unit handles 7-N sulfuric acid with negligible maintenance costs

(Pyrex brand heat exchangers are product of Corning Glass Works, Corning, New York.)

Check 3950 opposite last page.

"Gee, you have a BS and MS in chemical engineering? . . . All I got is a marriage license to his daughter."

CUSTOM FABRICATING DATA—*Request New Brochure M-56*

This information on plant facilities and services will be of value to purchasing, procurement and engineering personnel when planning the custom fabrication of...

CORROSION RESISTING VESSELS

for the Chemical Processing Industry on the West Coast

Send blueprints for prompt quotation on your next job

PS F SINCE 1900

PUGET SOUND FABRICATORS, INC.

3670 E. Marginal Way Seattle 4, Wash.

Craftsmen in steel plate and alloys up to 1"

Check 3951 opposite last page

UNIQUE AIR CYLINDER

CUTS COSTS

NO EXTRA VALVES TO BUY

4-way directional valve, and two-way speed control valves are built-in features of this different air cylinder. *No extra valves to buy.* It's a complete packaged air-power unit. You can have your choice of six built-in valve arrangements. Five bore sizes. Any stroke length.

FREE 4-Color Bulletin gives details

Write Dept. CP-358, The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto 18. Ask for Bulletin BM-25.

1011-B

The Bellows Co.

AKRON 9, OHIO

Check 3952 opposite last page

West German plant stops corrosion with mortar

Withstands sulfuric and other oxidizing acids

Problem: Strong sulfuric acid solutions are very corrosive to concrete; and in some areas of heavy spillage, a concrete pad can be disintegrated in as little as three months. At the Farbwerke-Hoechst plant in Germany (the old I. G. Farben Company), service conditions involve sulfuric acid at concentrations of 85 to 96%, and at times containing free chlorine. The temperatures of the liquids spilled run as high as 145°F. Sulfuric acid continuously wets and dries in the brickwork through alternating wet and dry conditions causing sulfation of sodium-containing mortars with a growth of sodium sulfate crystals which eventually softens the mortar, erodes joints.

Solution: Farbwerke-Hoechst developed and patented Corlok (Hoechst HFR Mortar) — a type of silicate bonding material based on a precisely adjusted potassium silicate. Material is essentially free from sodium silicate or other sodium compounds and contains no fluoride setting agents.

It is compounded to withstand strong oxidizing acids — such a nitric, chromic and concentrated sulfuric — and to resist sulfation and highly concentrated acids at temperatures up to 1900°F.

Results: Corlok mortar was installed in the Farbwerke-Hoechst plant in 1954 and has proved ideal in this particular application. Under difficult conditions where other mortars had proved unsatisfactory, it has provided maximum bond strength and impermeability of brickwork so that expensive and time-consuming replacement has been unnecessary.

(Corlok mortar is marketed in the United States by Pennsalt Chemicals Corporation, 3 Penn Center Plaza, Philadelphia 2, Pennsylvania.)

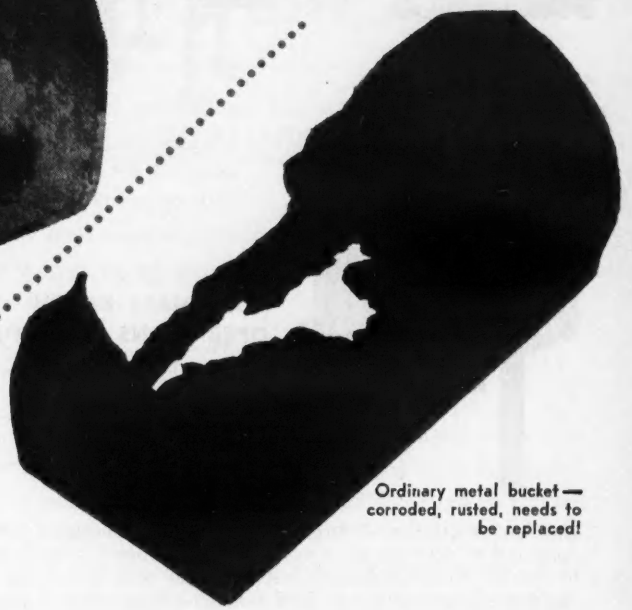
Check 3953 opposite last page.

No* Dura-Buket has ever worn out

COMPARE THESE BUCKETS AFTER ONE YEAR'S IDENTICAL USE

*Dura-Buket—special plastic by Fiberite Corporation — as good as new!

unretouched photographs



Ordinary metal bucket — corroded, rusted, needs to be replaced!

STRONG AND SHATTER-PROOF . . . HIGH SPEED . . . RUST PROOF . . . SPARK AND STATIC-FREE . . . SELF CLEANING . . . SANITARY . . . LONGER LIFE . . . ECONOMY

THESE two buckets were installed at the *same* time, on the *same* elevator leg. After just 12 months, the metal bucket was corroded so badly it required replacement. But the Dura-Buket is as good as new . . . will last many more years. Dura-Buket just can't rust. What's more it's *static-free, doesn't spark* and doesn't cake up.

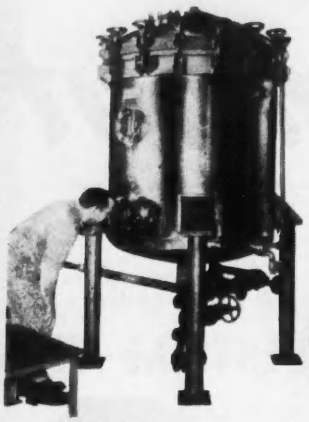
Ask your mill equipment distributor for prices and sizes . . . or write to:

Dura-Buket DIVISION
NATIONAL OATS COMPANY, EAST ST. LOUIS, ILLINOIS

Check 3954 opposite last page

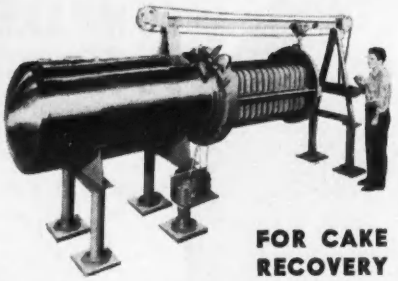
Niagara

the most dependable name in PRESSURE FILTERS



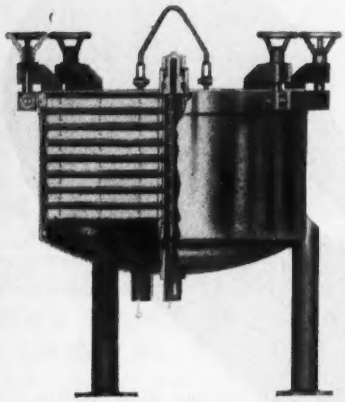
FOR LIQUID CLARIFICATION

Niagara vertical tank models are available in sizes up to 1000 sq. ft. Automatic cake discharge optional.



FOR CAKE RECOVERY

Niagara horizontal tank filters are designed for easy solids removal with capacities up to 250 cu. ft.



FOR SMALL BATCH OPERATIONS AND POLISHING

Niagara Batch-Miser® horizontal plate filters can be used with all types of filter media. Sizes 7.4 sq. ft. to over 200 sq. ft. in a single unit.

Our field engineers can provide you with an accurate and efficient appraisal of your filtration problem and a prompt recommendation of the filtration equipment best suited to your processing needs. Niagara's laboratories and field testing equipment are at your service. See our pages in Chemical Engineering Catalog.

FREE! NEW FILTER AREA CALCULATOR

Determines required filter area on basis of BOTH the *filtration rate* and the *cake capacity*. Write *today!*

Niagara FILTERS

A DIVISION OF

American Machine and Metals, Inc.

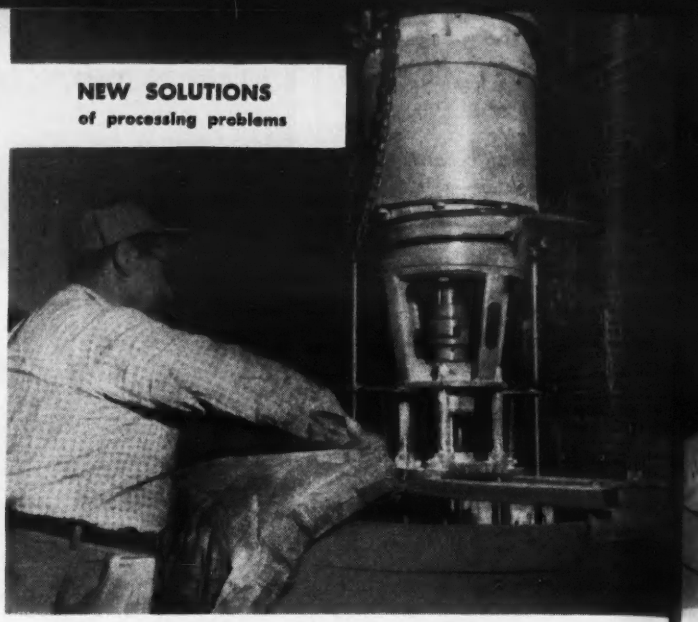
Dept. CPN-358, EAST MOLINE, ILLINOIS

(Niagara Filters, Europe: Kwakelpad 28, Alkmaar, Holland)

SPECIALISTS IN LIQUID-SOLIDS SEPARATION BY PRESSURE-LEAF, PLATE and ROTARY VACUUM FILTRATION and CENTRIFUGAL EXTRACTION

Check 3955 opposite last page

NEW SOLUTIONS
of processing problems



With the new unit, all mixing is done in one tank

The growing trend to water-thinned acrylic paints often creates a tough pigment-dispersion problem when manufacturing these products. New homogenizer-mixer at Paragon Paint and Varnish Corp., not only eliminates need for pre-mixing, but

TED F. MEINHOLD
Associate Editor
With **CHARLES FRIEDMAN**
Technical Director
Paragon Paint and Varnish Corporation
Long Island City, New York

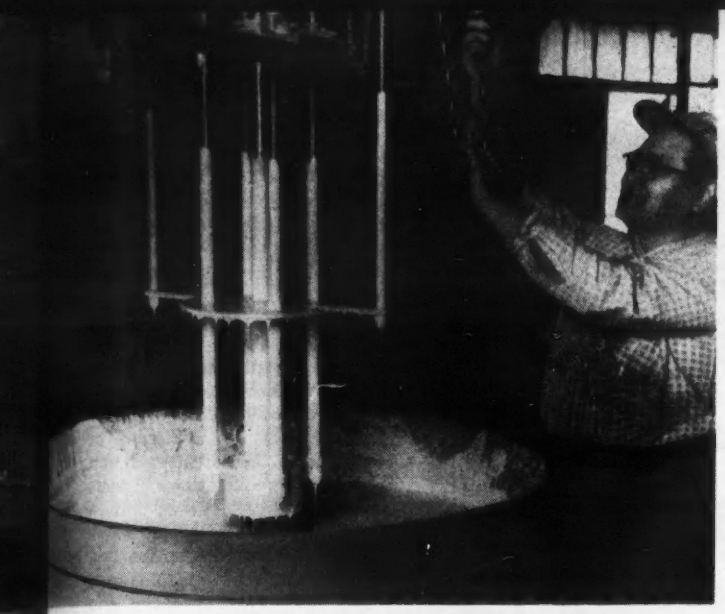
Problem: An efficient way of dispersing pigment in water-thinned acrylic paints was sought by Paragon Paint and Varnish Corporation, Long Island City, New York. The new method would have to guarantee stability and uniformity of grind, viscosity, dispersion, and color. Although the existing production method gave satisfactory results, it was slow, tedious, and costly.

Mixing was a two-step operation. Pigment, water, wetting agents, acrylic resins, defoamers, mildew-resistant agents, fillers, and other additives were first charged to a conventional paste mixer for pre-mixing. Mixture was then fed by means of a trough into a roller mill. There, running between rollers operating at different speeds, the paint was subjected to a combination compression and shearing action, and finally discharged by hand with a scraper.

Total mixing time for a 150-gal batch was over two hours — not including time required for charging, transferring, and emptying the product from the units. Cleaning the equipment was no snap either, requiring additional time and labor. In addition to two lines of acrylics, the company produces a full line of trade sales paints.

Solution: About a year ago, the company installed a trial model of a new type of homogenizer-mixer (see CHEMICAL PROCESSING, November 1956, pages 156-157). Unit is designed to permit rapid dispersion of pigments into the surrounding vehicle as well as to minimize the incorporation of air during the processing cycle.

The homo-mixer is a high-speed, high-shear unit with a turbine-stator mechanism. The motor is mounted above the homogenizing head, and mixing-homogenizing is carried



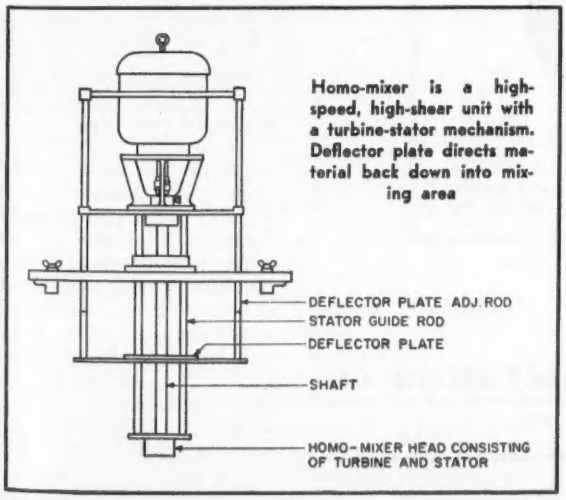
Cleaning presents no problem. Unit is simply hoisted out of vat, wiped, and run in water-detergent mixture for a few minutes

mixes, disperses acrylic paints 30% FASTER

on by immersing the head in a vat. The turbine rotates at a speed of from 3500 to 8000 rpm. This develops a pressure differential between the bottom of the turbine and the surface of the paint. As a result, paint is continuously drawn from bottom and forced to pass through restricted openings in the mixing head, which shears the material and breaks it down in size. There is no vortex and surface boil.

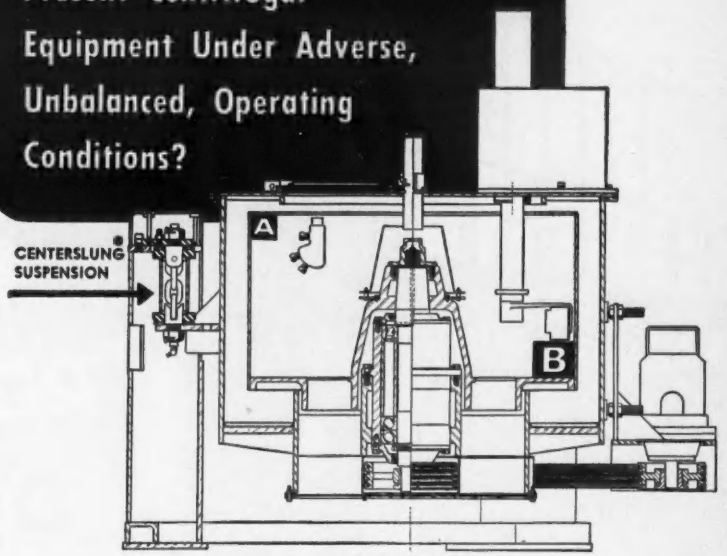
Since turbine also acts as pump, paint is discharged in an upward direction after it has passed through the homogenizing zone. An adjustable deflector plate, positioned above the mixing element, directs material back down into the mixing area where the cycle is repeated.

Results: The trial unit was tested extensively for six months. Results were so impressive that company bought



Homo-mixer is a high-speed, high-shear unit with a turbine-stator mechanism. Deflector plate directs material back down into mixing area

How Stable Is Your Present Centrifugal Equipment Under Adverse, Unbalanced, Operating Conditions?



Section of new Tolhurst Batch-O-Matic® combining for the *first time* Centerslung® suspension with bottom discharge, PLUS fully timer-controlled automatic batch programming.

Will your centrifugal equipment operate safely —

A WITH A DYNAMIC OUT-OF-BALANCE LOAD?
(Up to 5 lbs. out of balance at "A")

B WITH A STATIC OUT-OF-BALANCE LOAD?
(Up to 20 lbs. out of balance at "B")

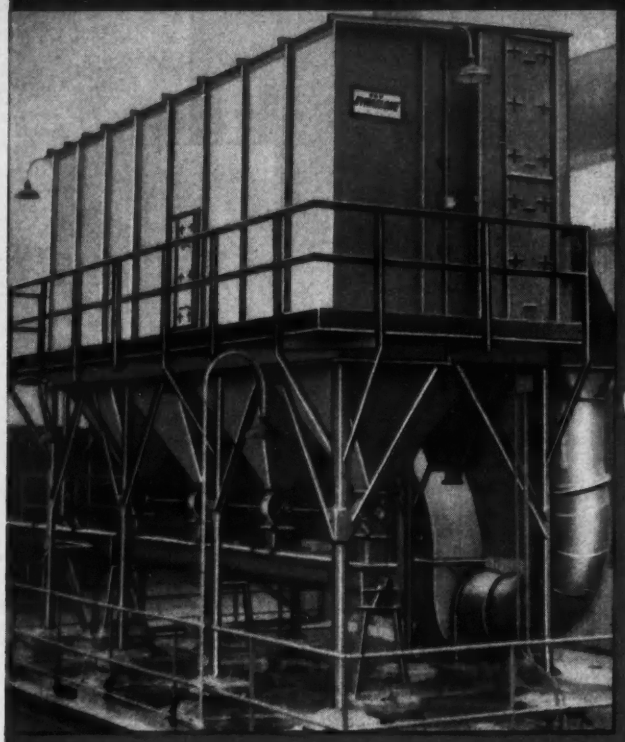
The new Tolhurst Batch-O-Matic Centrifugal passed these tests with no appreciable vibration being transmitted to the foundation — only a smooth oscillation on a horizontal plane and no vertical jumping. That's real assurance of Tolhurst's stability in handling all materials, free or slow-draining, even the toughest jobs. This big operating advantage is provided by exclusive Centerslung mounting — the highly stable suspension that minimizes bearing wear, downtime and other maintenance problems resulting from excessive vibration.

For help in connection with your centrifuging problems, call in your nearest Tolhurst representative. (He is listed in Chemical Engineering Catalog.) Or, write us direct.

Tolhurst CENTRIFUGALS
A DIVISION OF
American Machine and Metals, Inc.
Specialists in liquid-solids separation
Dept. CPT-358, EAST MOLINE, ILLINOIS

Check 3956 opposite last page

Now . . . a New High in Dust Filter Efficiency . . .



New SLY "ROLL-CLEAN" Dynaclone

Patent No. 2383039
Patent No. 2489681
Other Patents Pending

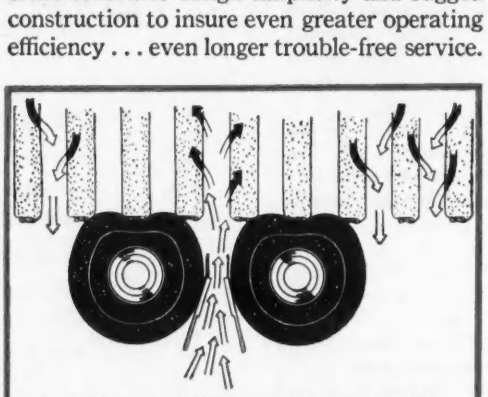
THESE NEW FIELD-PROVEN FEATURES

- Easier filter bag changing.
- Greater cloth area.
- Fewer operating parts.
- Free-rolling cleaner — no sliding.
- Complete dust seal — automatic seal adjustment.
- Easy access to all dust filter parts for inspection and servicing.

PLUS THESE TIME-TESTED DYNACLONE ADVANTAGES

- Constant suction at dust sources — complete dust collection.
- Self-cleaning for continuous operation.
- No auxiliary motors or blowers required for filter-bag cleaning.
- Greater filtering capacity and smaller space requirements — more cloth per cubic foot of filter than any other make.
- Lower power requirements.

The original self-cleaning dust filter, the Dynaclone has proven itself the most efficient dust filter ever made. The "Roll-Clean" Dynaclone combines design simplicity and rugged construction to insure even greater operating efficiency . . . even longer trouble-free service.



NEW "ROLLER CLEANER" provides greatly simplified method of cleaning dust from filter bags. Resilient rubber rolls automatically adjust to form a positive dust seal as each row of bags is cleaned by atmospheric air.

NEW CATALOG

36-page Bulletin 104 gives full details about "Roll-Clean" Dynaclone and other Sly Filters . . . contains valuable engineering information. Write for copy.

SINCE 1870 SLY

THE W. W. SLY MANUFACTURING CO.

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OFFICES IN PRINCIPAL CITIES

Check 3957 opposite last page

NEW SOLUTIONS

a 20-hp machine for full production use.

Almost from the very beginning, the tests showed that the old pre-mixing operation could be eliminated entirely. In addition, mixing time was cut 30% — providing an extra savings of about ½-hour on every 150-gal batch.

Despite shorter mixing time, all tests showed thorough dispersion and no evidence of flocculation. Batch after batch met rigid specifications — tests including draw down on a North Standard Gage, tristimulus color determination, both 60 and 85° tests on a photo-volt gloss meter, and viscosity.

When compared on a production basis over a given period of time, the homo-mixer was found to cost 25% less than a roller mill doing the same type of work.

With the new production unit all mixing is done in one vat. Bags of pigment are cut open and poured into the vessel containing water and wetting agents. After pigment is dispersed by the homo-mixer, acrylic resins, defoamers, and other additives are charged. Unit handles pastes as high as 110 Krebs in viscosity.

Cleaning the mixer presents no problem. Unit is simply hoisted out of the vat, wiped off, and then run in a water-detergent mixture for a few minutes. Total cleaning time is only about ½ that required by previous equipment.

(Eppenbach homo-mixer is product of Gifford-Wood Company, Hudson, N. Y.)

Check 3958 opposite last page.

Wrought iron pipe

Documenting more than a score of commercial and industrial wrought iron pipe installations, booklet of eight pages shows wrought iron's durability under wide variety of operating conditions. ASTM specifications under which pipe is manufactured are contained in booklet. "Wrought Iron O. D. Piping" — A. M. Byers Co., Dept. C-3, Clark Bldg., Pittsburgh 22, Pa.

Check 3959 opposite last page.

PROCESS PIPING POINTERS

Why diaphragm lasts longer in Y-body packless valves

In Y-pattern body packless valves, disc and diaphragm have separate functions: the disc for seating, the diaphragm only for sealing the bonnet against fluid entry. Diaphragm doesn't get the severe flexing, crushing and abrasion as in valves where diaphragm does both jobs. Widely used in chemical processing, Y-body valves come in broad selection of body, lining and diaphragm materials. See below for literature.

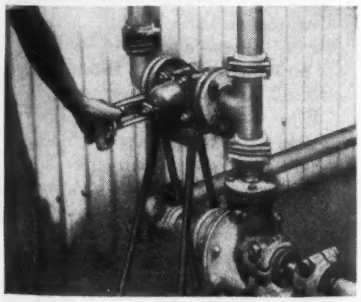
Use of plastic piping grows in process industries

Flexible polyethylene pipe of virgin material, now pressure-temperature rated in ½- to 2-inch sizes, is finding wider usage on corrosive as well as non-corrosive fluids. Modified polystyrene insert fittings assure leakproof joints—plastic-to-plastic or plastic-to-metal pipe and valves. Installation is fast, low-cost. Ask for Circular AD-2205—see below.

Genuine ammonia valves for ammonia—best practice

These valves—with a combination of heavy duty Ferrosteel body . . . tight stem and bonnet-joint sealing . . . and special lead-faced disc seating—cut the costs and hazards of handling ammonia. Available with screwed or flanged ends, the line includes globes, angles, checks—¼- to 4-inch sizes. Ask for Circular AD-1977.

Alloy plug gate throttles highly corrosive fluid



Read the good results a chemical plant is getting from this combination unrestricted flow or throttling service valve in handling corrosive xylene with dilute HCl. See next page.

Address J. E. Bradbury, Mgr., Chemical Sales Dept., for information on above products.

CRANE CO.

Gen'l Offices: 836 S. Michigan Ave., Chicago 5

VALVES • FITTINGS • PIPE

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Check 3960 opposite last page

CUT HERE AND FILE

Velocities and flow rates of fluids

C. P. SASSENRATH
San Pedro, Calif.

The following nomograph offers a convenient and rapid means of determining velocities, mass velocities, or flow rates for liquids and gases when flowing through pipes, towers, or exchange tubes. It helps to eliminate much of the routine slide rule calculations usually required for these problems.

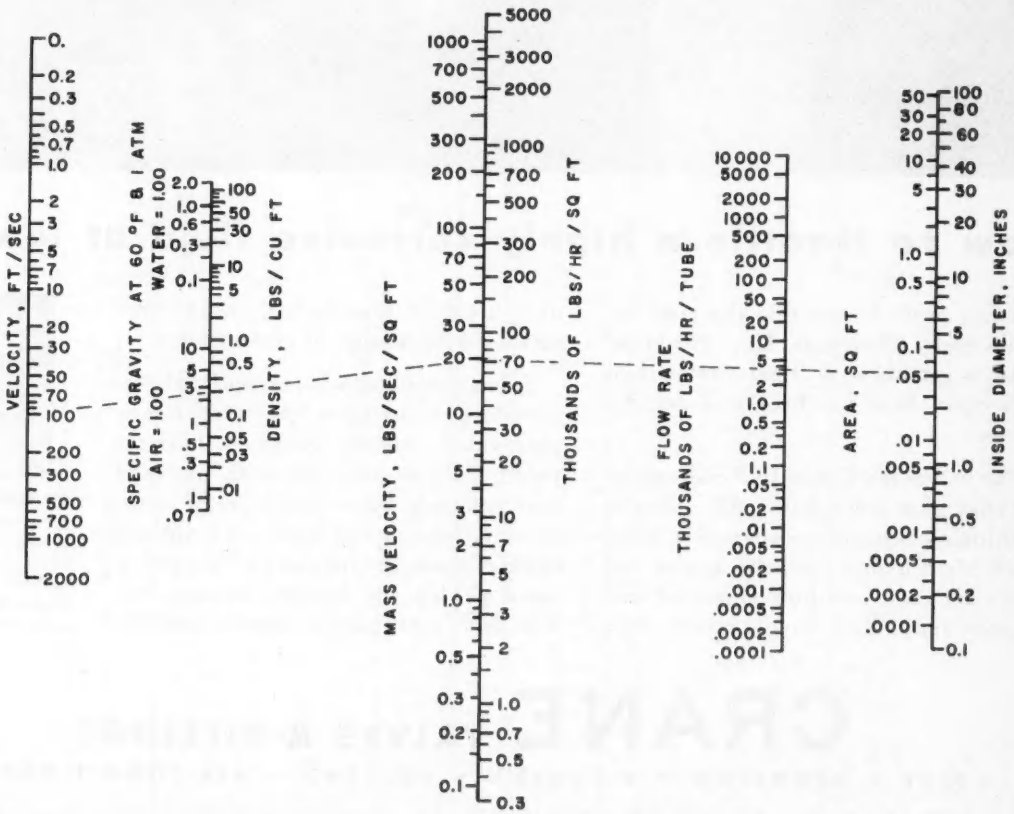
TYPICAL EXAMPLE

Given: Gas with density of 0.2 lb/cu ft is flowing at velocity of 100 ft/sec through 3-inch Schedule 40 pipe.

Required: Find mass velocity in lb/sec/sq ft and flow rate in lb/hr.

Solution:
1. Draw straight line through velocity (100 ft/sec) and density (0.2 lb/cu ft) scales, intersecting mass velocity scale at 20 lb/sec/sq ft.
2. Connect mass velocity (20 lb/sec/sq ft) with inside diameter of three-inch Schedule 40 pipe (3.068 inches — from the handbooks). This gives a value of 3,700 lb/hr on flow rate scale.

This nomograph may also be used to determine velocity, density, or flow area, if enough other variables are known.



Crane plug gate valves handle xylene with dilute HCl

How to throttle a highly corrosive fluid at low cost

You can profit by reading the good results Crosby Chemicals, Inc., Picayune, Miss., is getting with these combination wide-open flow or throttling service valves.

The valves are Crane 18-8 SMo stainless steel plug gates, No. 18851. They're in 2-inch, constant-speed pump lines, throttling a highly corrosive xylene and dilute HCl acid solution. Operated 6 to 8 times daily, they have already given over 2 years' trouble-free, repair-free service, with no sign of deterioration.

Extra durability with exceptional performance on corrosives is built into Crane plug gates. Seating design—a long tapered, circular plug disc with precisely matched body seats—has superior resistance to damage and wear. It gives and holds accurate flow regulation. Yet on wide-open service, the straight-through, full-area body ports permit unrestricted flow.

GET FULL FACTS on plug gates and other Crane quality alloy valves and fittings in Circular AD-2080. Supplied by your Crane Representative, or write to address below.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

Check 3961 opposite last page

NEW SOLUTIONS

Cuts noise level from ball mill 10 decibels

Mill enclosure stops 97% of sound energy

Problem: Noise emanating from large ball mill was disturbing at the St. Louis, Missouri, AEC uranium processing plant operated by Mallinckrodt Chemical Works. Noise study readings showed that noise level around the mill averaged about 108 decibels. It was impossible to hear a person talking, even if they were shouting.

The four-foot diameter by five-foot long, steel-head mill is charged with 7500 pounds of 1½-, 2-, and 3″-molybdenum alloy steel grinding balls. The unit is located on the first floor of a grinding plant with poured concrete floors and concrete block walls.

Solution: In order to obtain the largest possible sound reduction at the ball mill, a complete enclosure of some type was determined to be the most effective solution.

An enclosure was constructed which housed the mill, drive, and drum-type feeder. The concrete block wall was used as one side of this enclosure. The other three sides and the ceiling were made of Industrial Sound Control panels.

The wall panels were 3½″ thick with 10-gage solid black sheet iron on the outside, 20-gage perforated black sheet iron on the inside, and filled with Sound Blanket (No. 305) of spun lead and zinc slag, long fiber.

Roof panels were 3½″ thick with 20-gage solid black sheet iron on outside and 20-gage perforated black sheet iron on the inside. These were filled with the same sound blanketing material used in the walls.

One wall panel was provided with hinges so it could be used as a door.

Results: The general area noise level has been reduced about 10 decibels by the installation of the enclosure. Operators can now converse

To page 102

The Big 3...

Detergents for Chemical laboratories and chemical plants that

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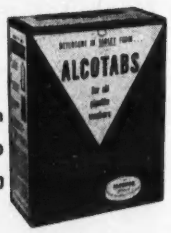
For all equipment washed by hand

Box of 3 lbs. $1.95
Case of 12 boxes—3 lb. ea. $18.00
Drum of 25 lbs. ..... .45 lb.
Drum of 50 lbs. ..... .42 lb.
Drum of 100 lbs. ..... .40 lb.
Drum of 300 lbs. ..... .37 lb.
(Slightly higher West of Rockies)

ALCOJET
For all equipment washed by machine

Box 5 lb. $3.00
Case of 6 boxes—5 lb. ea. $15.00
Drum 25 lb. ..... .45 lb.
Drum 50 lb. ..... .42 lb.
Drum 100 lb. ..... .40 lb.
Drum 300 lb. ..... .37 lb.
(Slightly higher West of Rockies)



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Case of 6 boxes of 100 tablets $30.00

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853 Broadway, New York 3, N.Y.

Check 3962 opposite last page

CUT HERE AND FILE

Circular equivalents of rectangular ducts

CLIFFORD L. DUCKWORTH
East Alton, Illinois

This nomograph, which is used to determine the circular equivalents of rectangular ducts, is based on known relationships[2].

Usual procedure for designing air handling systems is to size first for round ducts. If rectangular ducts are desired, sizes are selected that will provide the same air-carrying capacities as the round ducts originally chosen. When aspect ratio of rectangular ducts does not exceed 8:1, circular equivalents can be obtained from the equation

$$d_e = \frac{1.30\,(ab)^{0.625}}{(a+b)^{0.250}}$$

where a and b are sides of the rectangular duct and d_e is the circular equivalent for equal friction and capacity.

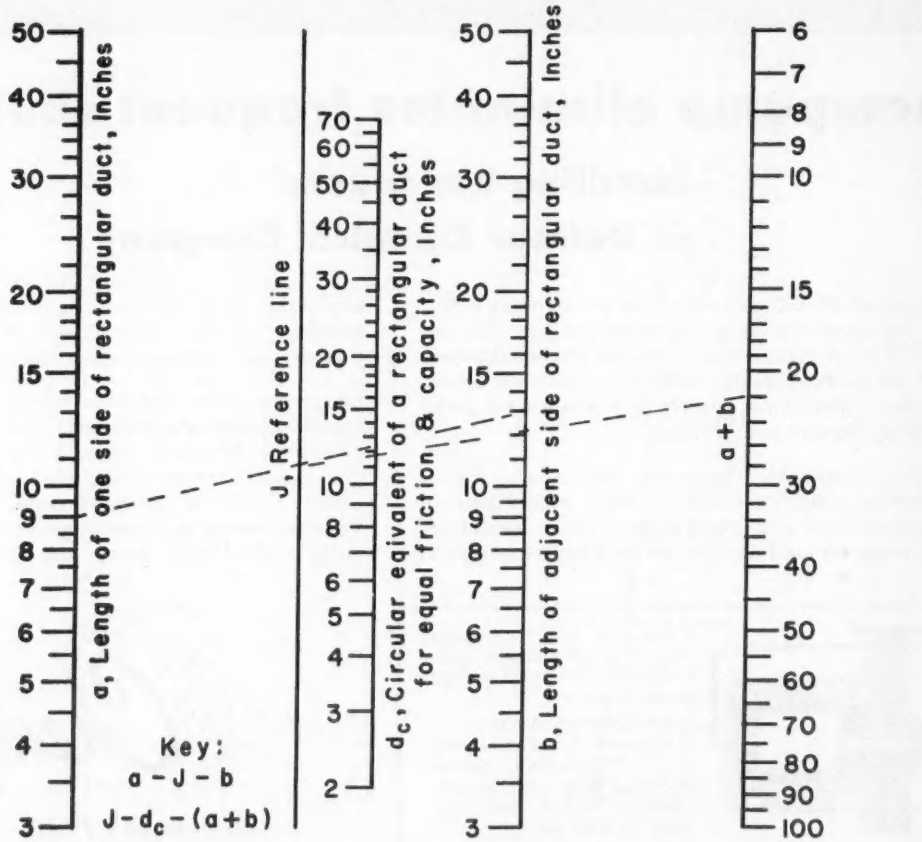
To determine the circular equivalent, connect a scale with b scale. Then connect intersection on reference line J with the sum of a and b. Read equivalent on d_e scale.

This nomograph was constructed by well-known methods[1].

LITERATURE REFERENCE

1) PERRY, J.H., editor, "Chemical Engineers' Handbook," 3rd ed, p 100, McGraw-Hill Book Co., Inc., New York, 1950.

2) "Heating, Ventilating, Air-Conditioning Guide," p 737, American Society of Heating and Air-Conditioning Engineers, 1956.


a, Length of one side of rectangular duct, Inches
J, Reference line
d_e, Circular eqivalent of a rectangular duct for equal friction & capacity, Inches
b, Length of adjacent side of rectangular duct, Inches
a + b
Key:
a - J - b
J - d_e - (a+b)

From page 100

in this area without straining. Calculations show that only three percent of the sound energy generated by the ball mill is transmitted through the enclosure.

(Article is based on paper prepared by F. N. Anderson, Project Engineering Supervisor, General Engineering Dept., Mallinckrodt Chemical Works, St. Louis, Missouri.)

(Sound metal panels and sound blanket are product of Koppers Company, Inc., Metal Products Div., Industrial Sound Control Dept., 200 Scott St., Baltimore 3, Md.)

Check 3964 opposite last page.

Ability of titanium to resist chlorine dioxide corrosion proven by paper company

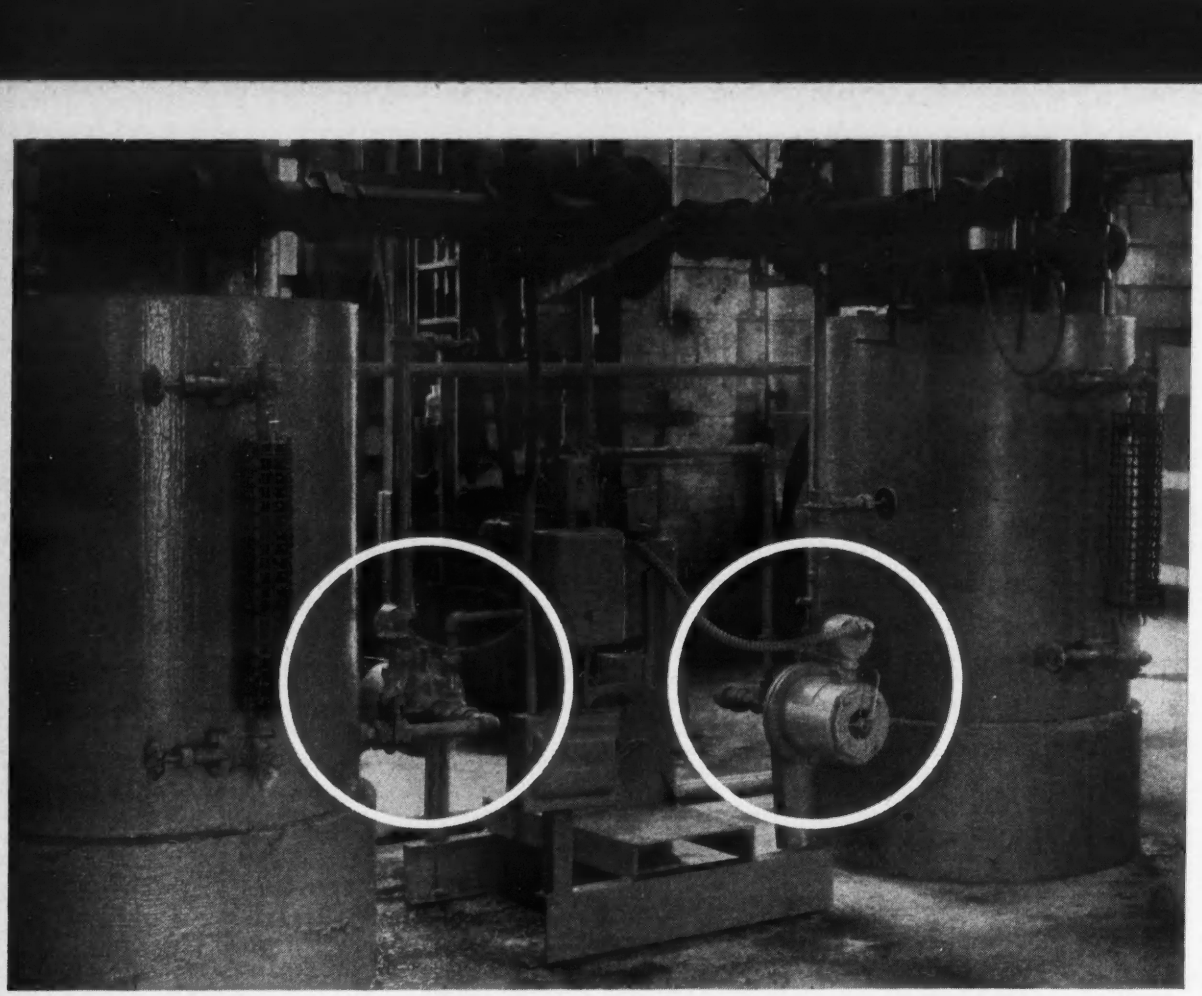
Titanium used in bleaching for over three years

Pioneer user of titanium in paper industry has been using the metal in its bleaching equipment for over three years. It has found that although first costs for titanium are higher, the metal is less expensive in the long run because it outlasts other corrosion-resistant metals.

Company's titanium thermowells cost almost 70% more than others which have been made of special alloy. Thermo-

To page 104

Titanium inlet nozzle is expected to more-than-double life expectancy of previously used pipe



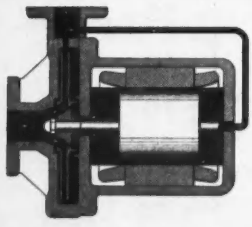
Chempump eliminates frequent shutdowns

handling hot caustic at Delmar Chemical Company

These two *Chempumps* are on the job 24 hours a day, 7 days a week at Delmar Chemical Company, Elkton, Md. They circulate caustic through scrubbing towers for gas purification, and have completely eliminated excessive shutdowns caused by conventional pump stuffing box and seal problems.

These dependable, leakproof pumps are out of operation only for a simple annual replacement of bearings, their only wearing parts. *Chempumps* have no seals, no stuffing box, no packing. No external lubrication is needed, since bearings are constantly lubricated by the pumped fluid itself. Caustic can't leak out and air cannot enter the pump.

Chempump offers many exclusive advantages in any chemical handling application. It would be well worth your while to check them. For details concerning your specific application, write to Chempump Corporation, 1300 E. Mermaid Lane, Philadelphia 18, Pa. Engineering representatives in over 30 principal cities in the United States and Canada.



Chempump combines pump and motor in a single, leakproof unit. No shaft sealing device required.

U.L. approved. Available in a wide choice of materials and head-capacity ranges for handling fluids at temperatures to 1000 F. and pressures to 5000 psi.

Chempump

First in the field...process proved

Check 3963 opposite last page

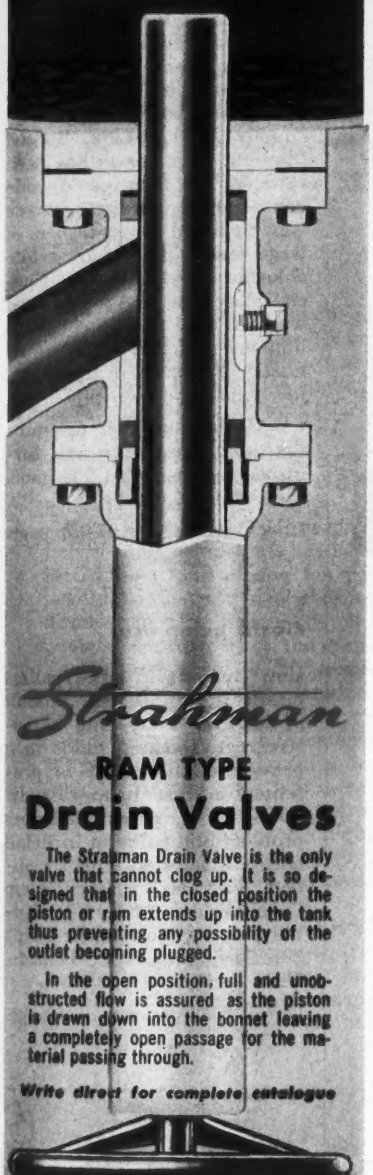
a

FLUSH BOTTOM VALVE

that

WILL NOT CLOG UP!

Designed for Chemical and Pharmaceutical Industries



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Drain Valves

The Strahman Drain Valve is the only valve that cannot clog up. It is so designed that in the closed position the piston or ram extends up into the tank thus preventing any possibility of the outlet becoming plugged.

In the open position, full and unobstructed flow is assured as the piston is drawn down into the bonnet leaving a completely open passage for the material passing through.

Write direct for complete catalogue

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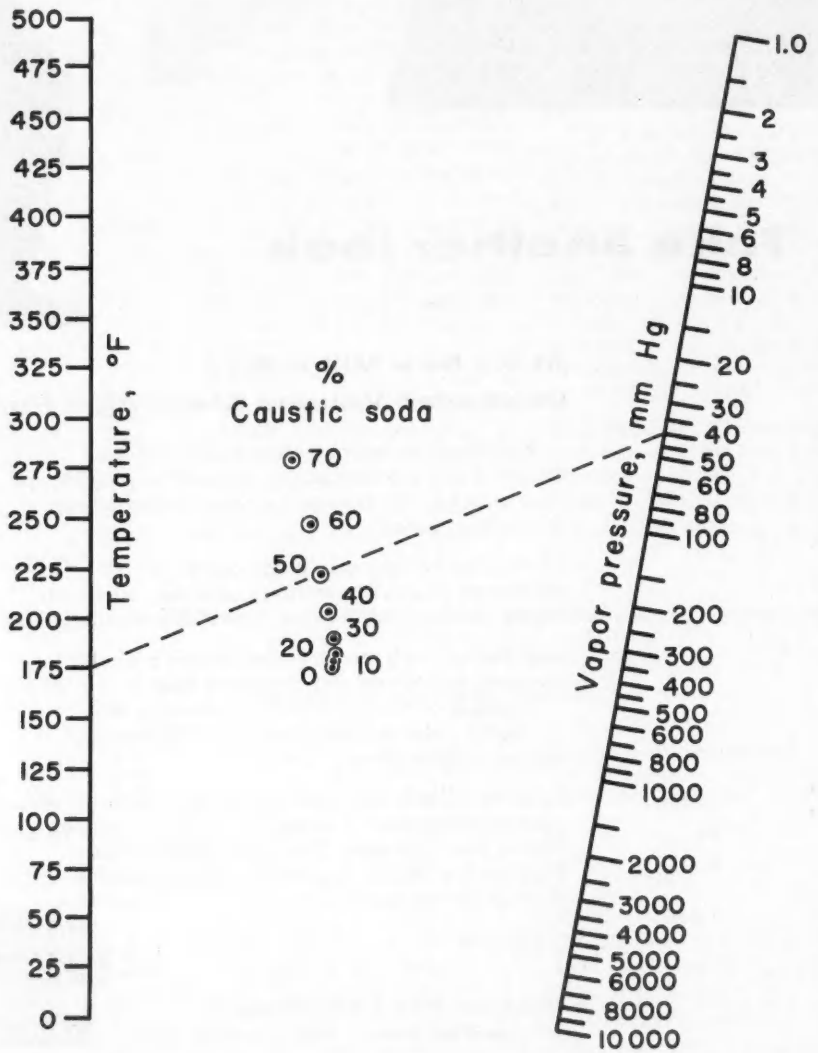
14 HUDSON STREET
NEW YORK 13, U.S.A.

Check 3965 opposite last page

Vapor Pressures of Caustic Soda Solutions

K. SIMONS
154 Martling Ave.
Tarrytown, N.Y.

This nomograph was plotted from data presented in Technical Service Bulletin 102, Hooker Electrochemical Company (1956). The index line shows that vapor pressure of 50% solution of caustic soda is 40 mm of mercury at 175°F.



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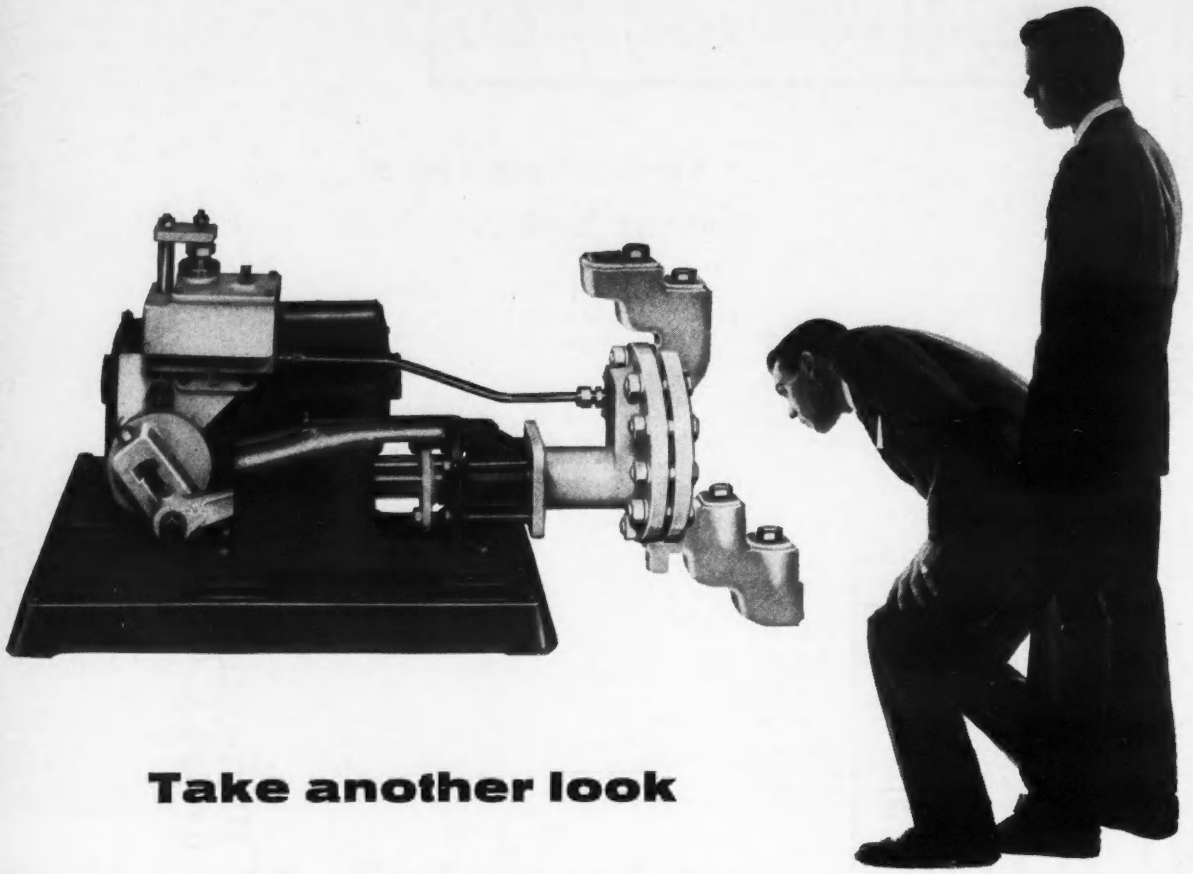

Take another look

At the New Milton Roy Controlled Volume Diaphragm Pump*

. . . For chemical metering applications requiring leakproof pump construction. *Available as complete new units or in kit form to convert existing packed-plunger Milton Roy pumps.*

Air binding in these diaphragm pumps is eliminated by positive mechanical action, once each stroke, to bleed air or vapor from the hydraulic fluid.

Step-Valve or column valve designs are available for pressures to 2000 psi and capacities from 1.1 to 138 GPH . . . manual or automatic 0-100% capacity adjustment . . . liquid ends interchangeable with Milton Roy packed-plunger pumps.

Take the Milton Roy approach to your metering and pumping problems . . . write for detailed information to Milton Roy Company, 1300 East Mermaid Lane, Philadelphia 18, Pa. Engineering representatives throughout the world.

*Patent applied for.

Controlled Volume Pumps • Quantichem Analyzers
Chemical Feed Systems • Anders Air and Gas Dryers

milton Roy
CHEMICAL INSTRUMENTATION SYSTEMS

Check 3966 opposite last page

NEW SOLUTIONS

From page 102

wells of the special alloy corroded and failed within a year from overpowering effects of chlorine dioxide. Titanium thermowells show no trace of corrosion after 3 yrs use.

Eight titanium thermowells are in operation in plant, which produces 200 tons of paper daily. Company saves $80 on each thermowell in replacement costs alone.

Titanium in orifice plates has also been used with equally good results. Special titanium inlet nozzle has been installed in chlorine dioxide generator equipment. Nozzle was installed at entrance of large feeder pipe leading into chlorine dioxide mixer. Special alloy pipe previously used washed out under corrosive influences of bleach. Titanium nozzle is expected to double life expectancy of pipe.

(A-55 Titanium plate and tube for nozzle assembly was furnished by Rem-Cru Titanium, Inc., Midland, Pa.)

Check 3967 opposite last page.

Plastic pump use

How manufacturer's sealless plastic pumps solved difficult problem of conveying corrosive metal-etching fluids in a printed circuit plant is presented in case history study. Four-page reprint describes problem and solution in detail and is illustrated with simplified diagrams. Plastic Pump Case History Study — Vanton Pump & Equipment Corp., 201 Sweetland Ave., Hillside, New Jersey.

Check 3968 opposite last page.

"Patience, Filbert!"

CESIUM AND RUBIDIUM COMPOUNDS — *lower in price and commercially available*

Price cut to 1/5 to 1/10 of previous cost of the chlorides, fluorides, sulfates, and carbonates of these two most reactive alkali metals

Now that they are available commercially, once rare cesium and rubidium compounds are expected to find many new applications, especially since prices have been cut 1/5 to 1/10 of previous quotations and now the compounds are obtained from a dependable source.

Until recently, world production of these compounds has been less than a total of one ton per year. Now they are available for developmental purposes by the pound-lot instead of by the gram. Raw materials are readily available for large tonnage production.

But why all the excitement? It's because these compounds are salts of the two most highly reactive alkali metals, and therefore have a number of unique properties. Couple these with a competitive price, and the prospects look very attractive.

Now that interest is stimulated by a lower price and an adequate supply, research on product improvement should turn up many additional applications to the suggestions that follow.

Cesium Compounds

The carbonate, sulfate, chloride, and fluoride are available in purities greater than 93%. Cesium is the most reactive of the alkali metals. It is able to lose its outer electron merely by the influence of light alone.

This property makes the metal and its alloys attractive for use in photoelectric cells, electron-emission cathodes, and photocathodes. Photocells made from the material can operate in portions of the infrared and ultraviolet regions.

The metal itself has been used to remove the last traces of air in vacuum tubes.

Cesium iodide and bromide optical crystals have a high degree of transparency and are used in infrared spectrometers. Addition of alkali halides (especially the iodides) to ZnS increases its absorption of X-rays.

When cesium hydroxide is used as the electrolyte in alkaline storage batteries, low-temperature operation is improved. Cesium compounds can be used as promoters in the iron catalyst used in ammonia synthesis. Atomic energy uses are under investigation.

Rubidium Compounds

These are also supplied as the carbonate, sulfate, chloride, and fluoride. Purities are higher — 95% minimum. Rubidium is the second most reactive of the alkali metals.

In addition to uses similar to cesium in photocells, ZnS screens for X-rays, low-temp electrolyte of alkaline storage batteries, and as promoter for iron catalyst in ammonia synthesis, rubidium will enhance the colors of various metal oxides if substituted for all or part of the alkali content.

RbH_2PO_4 has been found to have piezoelectric properties. Rubidium compounds can be used in making photo-luminescent materials.

Although the alkali metals resemble each other in many respects, there are significant differences because of variation in ionic dimensions, different heats of hydration, and the ease with which the outer electron is lost.

Because reactivity and many properties of the compounds depend greatly on the properties of the respective metal or cation, comparative data on the five alkali metals are given in the table.

The compounds are produced concomitant with manufacturers' lithium hydroxide production. After the Southern Rhodesian ores are relieved of their LiOH content, the end liquors are processed to recover cesium, rubidium, and potassium.

Additional cesium and rubidium compounds to the eight just introduced, are slated to be produced in the future.

(Rubidium and Cesium salts are products of American Potash & Chemical Corporation, 3030 W. Sixth St., Los Angeles 54, Calif.)

Check 3969 opposite last page.

Properties of the Alkali Metals

	Cesium	Rubidium	Potassium	Sodium	Lithium
Atomic weight	132.91	85.48	39.096	22.997	6.940
Density (@ 20°C)	1.90	1.53	0.86	0.97	0.534
Melting point (°C)	28.5	38.5	63.7	97.5	186.0
Important spectral line (Angstroms)	8521.1	7800.2	7664.9	5890.0	6707.8
Ionization potential of gaseous atoms (volts)	3.87	4.16	4.32	5.12	5.37
Volume of ions ($\times 10^{23}$ cc)	1.95	1.36	0.99	0.37	0.14
Solubilities of salts (Mols/100 cc H_2O @ 100° C)					
Chloride	1.607	1.148	0.760	0.681	3.007
Sulfate	0.609	0.306	0.138	0.296	0.272

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RAW MATERIAL COSTS
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UP TO 10¢ A GALLON
if you are now using a combination of ethyl and butyl acetate . . . you also gain the convenience of using one solvent in place of two, freeing a storage tank for other purposes.
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You pick up important cost savings by using Celanese n-Propyl Acetate in place of:
mixtures of isopropyl acetate and n-butyl acetate
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Unique Properties Make Celanese n-Propyl Acetate Ideal for Hot Spray Lacquer Formulations

In hot spray lacquer formulas, Celanese n-Propyl Acetate permits maximum viscosity reduction combined with good flow and blush resistance . . . at low cost! See your Celanese representative for information about the use of this Celanese solvent in hot spray and other formulations.

Celanese

CHEMICALS

Celanese Corporation of America, Chemical Division, Dept. 891-C, 180 Madison Avenue, New York 16, N.Y.

Export Sales: Ancel Co., Inc. and Fox Ancel Co., Inc., 180 Madison Avenue, New York 16, N. Y.

PETROCHEMICALS SECTION

—starts on page 135 in this month's CHEMICAL PROCESSING and is carrying news on the booming worldwide petrochemical industry.

Designed for Management

Section has been especially designed to meet the needs of petrochemical management.

It analyzes the meaning of petrochemical developments here and abroad. Engineering-type articles telling how costs can be cut, labor saved, or products improved are included.

Information on petrochemical processes are featured.

Reports study on petrochemicals

This month, the section leads off with continuation of study CHEMICAL PROCESSING made in cooperation with petrochemical leaders.

Report indicates petrochemical industry will top growth rate for either petroleum refining or chemical industry.

For more information on product at left, specify 3970 see information request blank opposite last page.

Fatty Acid Esters

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Check 3971 opposite last page

Can't flex off this lacquer

Uses: For coating glass-reinforced polyester plastic panels to inhibit discoloration and other degradation caused by exposure to weather and sunlight.

Features: Material has excellent adhesion upon flexing. When subjected to temperature fluctuations between −13 and 176°F, over 1 to 1½ year outdoor exposures, there was no sign of coating failure.

Description: Hetrolac 105 transparent lacquer comes in 55-gallon drums at 75c per pound, and in 5-gallon pails at 85c per pound.

(Hetrolac 105 is product of Hooker Electrochemical Co., PO Box 344, Niagara Falls, New York.)

Check 3972 opposite last page.

Low-cost polyester resin for foamed urethanes give good physicals

Uses: For making flexible or rigid urethane foams.

Features: Flexible foaming resin provides products of excellent load-carrying capacity at low densities, higher resilience, good freeze resistance, good "feel," and greatly reduced cost. Foam is made by one-shot process.

Rigid resins give very tough, rigid foam structure with good adhesion and molding properties.

Description: The polyester resin series is designated Selectrofoam Resin 6207 (for flexible foamed products), and Resins 6004 and 6005 (for rigid products).

(Selectrofoam Resins are products of Pittsburgh Plate Glass Co., 632 Fort Duquesne Blvd., Pittsburgh 22, Pa.)

Check 3973 opposite last page.

Solvent emulsifier data

Data sheet describes broad range solvent emulsifier for hydrocarbon solvents. TB 1057-2 — Sole Chemical Corp., 27 East Monroe St., Chicago 3, Illinois.

Check 3974 opposite last page.

versatile, selective reducing agents, foaming agents—

1

POTASSIUM BOROHYDRIDE KBH_4
SODIUM BOROHYDRIDE $NaBH_4$

Potassium Borohydride is easy to handle—has great storage stability plus the versatility and selectivity of other alkali metal borohydrides. Used in reduction of ketones and aldehydes without reduction of double bonds and other reducible groups. Write for Bulletin C-120.

As foaming agents both $NaBH_4$ and KBH_4 offer high gas evolving capacity: 2.37 liters of H_2 per gram of $NaBH_4$ (38 cu. ft./lb.) and 1.66 liters of H_2 per gram of KBH_4 (26.6 cu. ft./lb.).

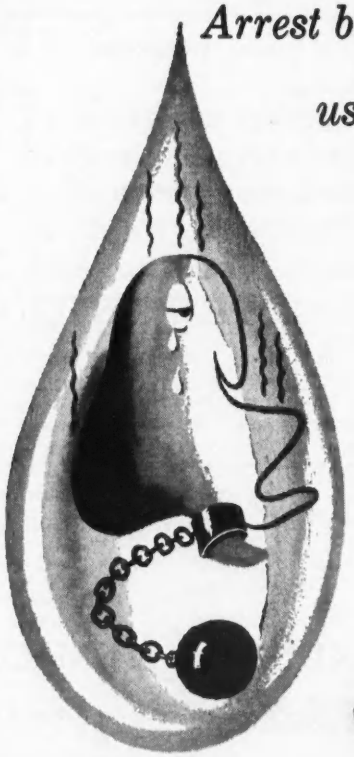
Sodium Borohydride, in a variety of solvents, is commonly used to reduce aldehydes and ketones without effect upon other groups. It has high reducing capacity. Write for Bulletin C-110.

Phone: FOrest 4-1130 TWX: Perrysville, Pa. 117

GALLERY CHEMICAL COMPANY
PITTSBURGH 37, PENNSYLVANIA

Check 3975 opposite last page

Arrest bad odors...
use **SINDAR'S DEODALL®**



The elimination of unpleasant odor is an important concept of modern merchandising, whether the product is a consumer paint or varnish or an industrial material such as a cutting oil, solvent or fertilizer.

You can assure complete freedom from unpleasant odors by using Sindar's multipurpose masking agents in your product.

A description of the material and any pertinent production data will help our specialists select the right *Deodall* for your use.

SINDAR® Corporation
Industrial Aromatics and Chemicals
330 West 42nd Street, New York 36, N.Y.

Check 3976 opposite last page

HIGH PURITY RARE EARTHS

Available in quantities at surprisingly low cost

a report by LINDSAY

A few months ago, in one of these reports, we presented this table of high purity rare earth and yttrium oxides. We anticipated inquiries, of course, but the flood of letters requesting detailed information really startled us.

What interests us particularly, and will you, is the fact that so many research people are intrigued with the practical possibilities of these unique materials. The large amount of research now being done on high purity rare earth oxides in a wide variety of industries encourages us to suggest the likelihood that they may offer you opportunities for potentially profitable investigation.

Already, in a little more than two years since rare earths in purities up to 99.99% became available in commercial quantities, they are being used as basic production materials in many chemical and industrial operations.

Production Up—Costs Down

We have expanded our production facilities to keep up with demand and now have more than 100 ion exchange columns in continuous operation. Quantities are large enough to assure you a dependable source of supply. Prices are low enough to make their use on a production basis economically sound.

Most of the high purity rare earth and yttrium oxides are available for prompt deliveries in quantities of an ounce to hundreds of pounds.

We can't tell you how to use high purity rare earths in your production operations, nor can we promise that one of them may be the missing element in new process or product developments on which you are working. We *can*, however, supply you with data which you will find interesting, revealing and quite possibly of immediate importance to you.

TYPICAL MAXIMUM IMPURITIES IN LINDSAY PURIFIED RARE EARTH AND YTTRIUM OXIDES

ATOMIC NO.	OXIDE	CODE	PURITY	% RARE EARTH MAXIMUM IMPURITIES AS OXIDES
57	La_2O_3. LANTHANUM OXIDE	528 529	99.99 99.997	0.01 Pr, 0.001 Ce. 0.0025 Pr, 0.0005 others
58	CeO_2. CERIC OXIDE	215 216	99.8 99.9	0.2 (largely La + Pr + Nd). 0.1 (largely La + Pr + Nd).
59	Pr_6O_{11}. PRASEODYMIUM OXIDE	726 729.9	99 99.9	1 La + Nd + smaller amounts of Ce and Sm. 0.1 Ce + Nd.
60	Nd_2O_3. NEODYMIUM OXIDE	628 629 629.9	95 99 99.9	1-4 Pr, 1-4 Sm, 0.5-1 others. 0.1-0.4 Pr + 0.1-0.4 Sm + 0.5 others. 0.1 (largely Pr + Sm).
62	Sm_2O_3. SAMARIUM OXIDE	822 823	99 99.9	0.2-0.7 Gd, 0.2-0.6 Eu, and smaller amounts of others. 0.1 (largely Nd + Gd + Eu).
63	Eu_2O_3. EUROPIUM OXIDE	1012 1011	98-99 99.8	1-2 Sm + smaller amounts of Nd + Gd + others. 0.2 (largely Sm + Gd + Nd).
64	Gd_2O_3. GADOLINIUM OXIDE	928.9 929.9	99 99.9	1 Sm + Eu + trace Tb. 0.1 Sm + Eu + trace Tb.
65	Tb_4O_7. TERBIUM OXIDE	1803 1805	99 99.9	1 Gd + Dy + Y. 0.1 Gd + Dy + Y.
66	Dy_2O_3. DYSPROSIUM OXIDE	1703 1705	99 99.9	1 (largely Ho + Y + Tb + small amounts of others). 0.1 Ho + Y + traces of others.
67	Ho_2O_3. HOLMIUM OXIDE	1603 1605	99 99.9	1 (largely Er + Dy + small amounts of others). 0.1 Er + Dy + traces of others.
68	Er_2O_3. ERBIUM OXIDE	1303 1305	99 99.9	1 Ho + Dy + traces Yb and Y. 0.1 Ho + Tm.
69	Tm_2O_3. THULIUM OXIDE	1405 1403	99.9 99	0.1 Er + Yb + trace Lu. 1 Er + Yb + trace Lu
70	Yb_2O_3. YTTERBIUM OXIDE	1201 1202	99 99.9	1 Er + Tm + trace Lu. 0.1 Tm + trace Lu + Er.
71	Lu_2O_3. LUTETIUM OXIDE	1503 1505	99 99.9	1 Yb + Tm + traces of others. 0.1 Yb + Tm + traces of others.
39	Y_2O_3. YTTRIUM OXIDE	1112 1115 1116	99 99.9 99.9+	1 Dy + Gd + traces Tb and others. 0.1 Dy + Gd + traces Tb Approx. 0.05 Dy + Gd.

For detailed information and prices, write for our bulletin "Purified Rare Earth and Yttrium Oxides"

PLEASE ADDRESS INQUIRIES TO:

LINDSAY CHEMICAL COMPANY

World's Largest Producer of Thorium and Rare Earth Chemicals

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Check 3977 opposite last page

CHEMICAL MATERIALS

Make thermostable water-in-oil emulsions

Addition of water to oily products can upgrade them

Uses: To prepare water-in-oil emulsions, especially for pharmaceuticals, cosmetics, and paste and liquid waxes, duplicating and stencil inks, paints, and lubricating waxes and oils.

Features: Water-in-oil emulsions will not separate at temperatures to 200°F (per ASTM steam emulsion test).

Benefits to be obtained by dispersing some water in oily products include: Certain physical characteristics can be improved and costs can be lowered when many fats and waxes are extended. Emulsifier will disperse salts, dyes, biologicals, and other substances which are hydrophilic, into an oily product.

Emulsifier permits development of products with continuous oil phase rather than a continuous water phase. Emulsions are pure, tasteless, and odor-free and are suitable for food, pharmaceutical, and cosmetic use.

Description: Emocithin emulsifier is a semisolid and comes in 60-lb cans in food and industrial grades. It is easily incorporated in animal, vegetable, or mineral oils, fats, or waxes by warming and blending techniques. Quantities in use range from 1/10 to 2% of the oil content (called the lipophase).

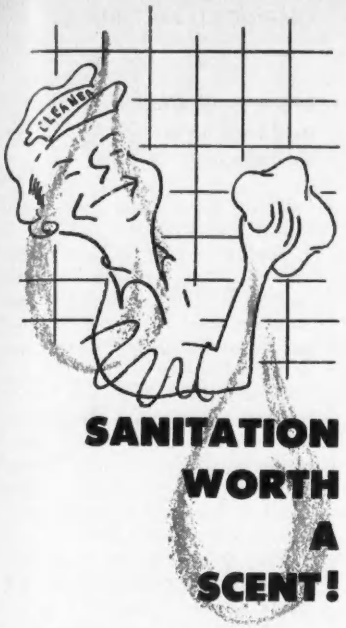
(Emocithin is a product of Sholten's Chemische Fabrieken, Foxhol, Netherlands, and is available in US through Morningstar-Paisley, Inc., 630 W. 51st St., New York 19, New York.)

Check 3978 opposite last page.

Zinc oxides

Beautifully done 48-page brochure gives full information on zinc oxides: manufacture, uses, history. "Zinc Oxides" — St. Joseph Lead Co., 250 Park Ave., New York 17, N.Y.

Check 3979 opposite last page.



SANITATION WORTH A SCENT!

In the changing world of today, sanitation plays an increasingly important role. In home and industry, plant and office, washroom and lobby, various preparations designed to cleanse and deodorize are in constant and ever-expanding use. *But sanitation alone, today, is not enough!* The increasingly odor-conscious public demands *disinfectants, para blocks* and *napthalene crystals, liquid soaps, polishes* and *cleansers* that are pleasantly scented as well. Build your sanitary products sales by giving them a subtle, appropriate fragrance that is distinctively their own. Make it an integral part of your brand recognition. To assist you in this effort, the D&O Industrial Odorant Labs are at your service. Consult D&O.

"Essentially for you!"

D&O ESTABLISHED 1798

Our 159th Year of Service

DODGE & OLCOTT, INC.

180 Varick Street • New York 14, N. Y.

Sales Offices in Principal Cities

ESSENTIAL OILS • AROMATIC CHEMICALS • PERFUME BASES • FLAVOR BASES • DRY SOLUBLE SEASONINGS

Check 3980 opposite last page

General-purpose acrylic laminating resin in syrup form

Liquid acrylic resin makes the beauty and weatherability of pure acrylic available for low-pressure laminates.

Resin gives laminates that are free from color change and have good gloss retention and resist surface erosion. Impact and abrasion resistance are outstanding. One reason for this is that the acrylic syrup contains no aromatic components.

Laminates can be made by methods now used in the reinforced plastics industry, such as contact pressure, press lamination, and premix.

Price or date of commercial availability have not yet been announced.

(Lucite "syrup" is a product of E.I. du Pont de Nemours & Co., Wilmington 98, Del.)

Check 3981 opposite last page.

Water-soluble fungicides

Two water-soluble fungicides have been introduced to the adhesive, paper, leather, and coating industries. Sodium *p*-chlor-*m*-cresolate trihydrate (PCMS) has approximately 66% purity, 90°C melting point, is supplied as off-white granules.

Sodium salicylanilide (SAS, 74% purity) occurs as light tan granules which decompose at about 210°C.

(PCMS and SAS are products of Chemo Puro Mfg. Co., Newark 5, N. J.)

Check 3982 opposite last page.

Color standards chart

Color standards comparison "slide rule" quickly converts product color readings between five scales. Indicator for easy identification of manufacturer's fatty acids is on back of chart. Color rule — Chemical Division, Armour & Company, 1355 W. 31st St., Chicago 9, Illinois.

Check 3983 opposite last page.

...a polymer additive; mild acid anhydride; organic-soluble; metal fire extinguishent –

TRIMETHOXY-BOROXINE

2

Trimethoxyboroxine, $(CH_3O)_3B_3O_3$, is a colorless liquid that contains 60 percent boric oxide, is miscible with organic solvents, and useful for extinguishing fires of magnesium, titanium, zirconium and other metals.

It reacts with water, alcohols and epoxides, and forms complexes with amines. Trimethoxyboroxine is a convenient liquid for introducing borate structures into polymers. In fire fighting applications it burns to leave a molten boric oxide over the metal. Production quantities available. Write for Technical Bulletin C-550.

Phone: FOrest 4-1130 TWX: Perrysville, Pa. 117

GALLERY CHEMICAL COMPANY

PITTSBURGH 37, PENNSYLVANIA

Check 3984 opposite last page

...a highly reactive gas; a strong Lewis acid; a flame-speed accelerator with an extremely high heat of combustion –

DIBORANE B_2H_6

3

Diborane, the simplest of boron hydrides, decomposes slowly at room temperature—and more rapidly at higher temperatures—to hydrogen and higher-molecular-weight boron hydrides. It is completely hydrolyzed by water—either neutral or acidified. Diborane burns in air with a green flame to give boric oxide and water (or boric acid).

Applications include uses as intermediate, reducing agent, catalyst and flame-speed accelerator. It can be stored at low temperatures and can be handled safely with suitable precautions. Write for Technical Bulletin C-020.

Phone: FOrest 4-1130 TWX: Perrysville, Pa. 117

GALLERY CHEMICAL COMPANY

PITTSBURGH 37, PENNSYLVANIA

Check 3985 opposite last page

NOW COMBINED

in emulsion form

Molecular model of combination of vinyl chloride with vinyl acetate. Arrows show connections to rest of polymer chain.

Another National first! This time: an emulsion copolymer of vinyl chloride and vinyl acetate. Its name: RESYN® 2507.

RESYN 2507 is a striking new adhesive-binder that combines the properties of polyvinyl acetate with polyvinyl chloride. It heat seals at low temperatures. It wet bonds a wide range of materials that include vinyl sheeting and synthetic fibers.

RESYN 2507 is amazingly simple to formulate. Its viscosity is reasonably high—like a polyvinyl acetate emulsion. Thickening is unnecessary. Many plasticizers can be stirred in without pre-emulsification. Other outstanding characteristics: Good wet tack. Exceptional mechanical stability. Superior holdout on porous surfaces. Borax compatibility.

RESYN 2507 shows promise for fire retardant coatings and nonwoven textiles in addition to its many adhesive applications. Additional information will be sent on request.

RESIN DIVISION

National

STARCH PRODUCTS INC.

270 Madison Avenue, New York 16 • 3641 So. Washtenaw Avenue, Chicago 32 • 735 Battery Street, San Francisco 11

Check 3986 opposite last page

Imparts flexibility and toughness to epoxies

Uses: As curing agent for liquid epoxy resins.

Features: Material is more "fluid" than curing agents having similar properties, and is very easy handling. It imparts flexibility and toughness to cured epoxy.

Description: Epoxy resin curing agent is compatible with liquid epoxy resins over wide range of ratios. These mixtures can be cured in thin films or castings at room temperatures.

For best results, use 67 parts of curing agent to 100 parts of epoxy resin.

Physical properties are: weight per gallon at 80°F, 7.9; viscosity at 80°F, 6 poises.

(Lancast-A is product of Lancaster Chemical Corp., Broad and 13th Street, Carlstadt, N.J.)

Check 3987 opposite last page.

Castor oils in urethanes

Castor oil products have the lowest density of the four major classes of polyhydroxy compounds used in making urethane polymers. Their technology is covered in 24-page Technical Bulletin #31 — The Baker Castor Oil Co., 40 Ave. A, Bayonne, N.J.

Check 3988 opposite last page.

Synthetic fatty oil has low viscosity, pour point

Has superior wetting and adhesion to metal

Uses: May be sulfurized, phosphated, chlorinated, or sulfonated to make bases and other additives for lubricants, cutting oils, rust inhibitors, and gear oils. For textiles, synthetic oil can be sulfonated to make soluble oils or can be used by itself as a lubricant in place of lard oil, sperm oil, oleic acid esters, olive oil, and other oils. It makes a

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Prepared by U. S. Industrial Chemicals Co.

U.S.I. CHEMICAL NEWS

★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★

U.S.I. in New Company to Develop High Energy Fuel

A new company has been formed to carry out process development and semi-pilot plant work on a high energy, boron-based fuel, under Air Force contract. The company, AFN, Inc., is owned one-third each by American Potash, Food Machinery, and the U.S.I. Division of National Distillers.

The combined resources and knowledge of the three participating companies cover almost the entire chemical industry. U.S.I. produces sodium, polyethylene, alcohols, special metals, and a large variety of other chemicals. American Potash makes boron chemicals, lithium, chlorates, perchlorates, and many other products. Food Machinery supplies alkalies, phosphates, peroxygen chemicals, insecticides, among other products.

The initial work will be carried out at Henderson, Nevada.

Ammonia, Sodium Metal Used for Recovering Pure Anhydrous Hydrazine

A solution has been found to the difficult problem of separating ammonium chloride from hydrazine made by the oxidation of ammonia with chlorine. The patented process provides for the addition of metallic sodium in anhydrous ammonia to the mixture of hydrazine, anhydrous ammonia and ammonium chloride.

The sodium reacts with ammonium chloride to produce ammonia, hydrogen and sodium chloride. Since salt is relatively insoluble in liquid ammonia, most of it precipitates out as a solid which can be removed easily by filtration, decantation or other similar means. A solution of hydrazine in liquid ammonia remains, from which pure hydrazine is readily recovered by fractionation.

Yields in the order of 97% have been obtained by adding an amount of sodium exactly equivalent to the chloride ions present. The reaction proceeds at room temperature.

U.S.I. is a producer of metallic sodium and anhydrous ammonia, both of which are used in this process.

Metals Can Now Be Melted While Suspended in Space

A new technique called levitation melting permits researchers to prepare small specimens of metals and alloys with purity levels difficult to reach by ordinary means. The metal or alloy is placed in a high frequency AC electro-magnetic field which causes it to float freely suspended in space, and to melt.

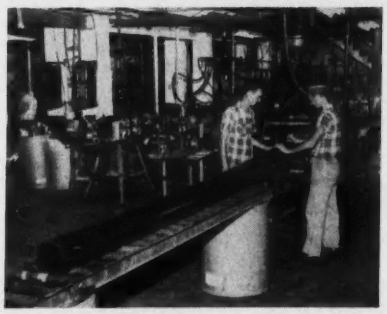
The process uses no containing vessel, and proceeds in an inert atmosphere, eliminating sources of contamination. Melting is achieved in seconds, and electro-magnetic stirring action gives thorough mixing of the melt.

MORE

Longest Polyethylene Pipeline Carries Brine Between Process Plants at Ashtabula, Ohio

Pipe Made of U.S.I. PETROTHENE® Resin Runs for 6,200 Feet From Mallory-Sharon Metals Plant to U.S.I. Sodium Plant

When the problem arose of moving a corrosive solution of saturated brine over 6,200 feet of terrain broken by roads, streams and railroad tracks at Ashtabula, Ohio, U.S.I. decided to use a polyethylene pipeline. Polyethylene was chosen for the job after a thorough study of other materials such as plastic-lined iron, rubber-lined steel and polyvinylchloride. It has the advantages of corrosion resistance, minimum maintenance requirements, ease of fabrication and installation.

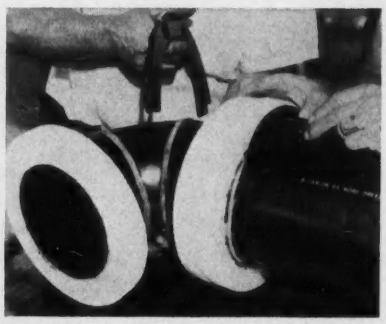


Polyethylene pipe leaving extruder at Carlon Products' Asheville, N. C. plant.

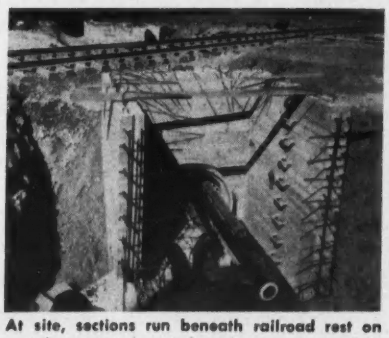
Now in operation, the pipe has an inside diameter of six inches, an outside diameter of 7¼ inches. It is made of U.S.I. PETROTHENE 561 virgin polyethylene compounded with carbon black. The pipe was supplied in 30-foot lengths flanged with polyethylene rings and bolted together at the installation site.

Carrying brine at temperatures ranging from 70 to 90°F, 24 hours a day, 7 days a week, the pipe runs from the brine settling pond at Mallory-Sharon Metals zirconium and titanium sponge plant to the sodium plant of U.S.I.

After cutting pipe into 30-foot sections, polyethylene flanges are hot-gas-welded to pipe.



Steel back-up rings are attached to flanges where elbow meets straight section of pipe.



At site, sections run beneath railroad rest on metal support in reinforced concrete conduit.

After connecting lengths of pipe, line is rolled into trench, needs no further attention.

U.S.I. CHEMICAL NEWS

CONTINUED

Metals Melted In Space

Upon completing the melt, the voltage is lowered, allowing the molten metal to be dropped into a mold. The metal or alloy specimen which results can be used for mechanical testing, metallographic examination, hardness measurements, X-ray diffraction or magnetic studies.

Levitation melting apparatus has been studied at the U.S.I. metals laboratory at Cincinnati, Ohio, for the examination of zirconium, titanium and other special metals.

Levitation melting apparatus in operation. (Photo courtesy Westinghouse Industrial Electronics Department.)

Urethane Foam Can Now Be Sprayed on; It Cuts Insulating Labor Costs

Equipment and techniques for spraying urethane polymer onto overhead, vertical or irregular surfaces, so that it foams and sets in place, have recently been perfected. Insulating coats up to two inches thick can be applied rapidly to vessels, buildings and machinery with no slipping, sagging or falling away of the foam.

In test applications, insulating jobs have been completed in 1/12 the time (calculated in man-hours) required for installing conventional insulating materials. Suppliers of polymer and spray apparatus figure that on ordinary jobs, a trained operator can apply 12 sq. ft. per minute of one inch thick foam.

Since urethane foams are formed by mixing a catalyst with a liquid prepolymer just before application, special spray equipment has been developed which proportions the two materials accurately, and mixes them thoroughly. The polymer formulation itself has been adjusted to meet two opposing types of requirements. It foams and sets rapidly enough to give proper thickness and good adhesion to surfaces. At the same time, it foams and sets slowly enough to avoid clogging of the spray gun.

Flexible and rigid polyurethane foams are produced from the reaction of polyesters with diisocyanates. An intermediate that can be used to produce the polyesters is U.S.I. ISOSEBACIC acid, a mixture of C-10 dibasic acids.

New Decomposition Unit Regenerates Spent Sulfuric At U.S.I. Sunflower Plant

Sulfuric acid regeneration facilities have recently been added to the Sunflower Ordnance plant operated by U.S.I. at Sunflower, Kansas. The new installation converts spent sulfuric acid into sulfur dioxide for use in the plant's oleum and virgin sulfuric acid production process.

Its design capacity is 70 tons of alkylation spent acid per day. The regenerated sulfuric acid is identical to that produced from sulfur.

The unit has no effluent, uses no water and requires only a minimum of outside fuel. Much of the heat is provided by the hydrocarbons in the spent acid, while natural gas and sulfur supply the balance.

With the addition of these new facilities, the Sunflower plant now has a capacity of 250 tons per day on a 100% sulfuric acid basis.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Chemical literature is described and classified in a 398-page guide now being sold. Kinds of chemical information are analyzed, ways of keeping current are suggested, use of libraries and indexes is discussed. **No. 1321**

New anionic surface active agent is used in the emulsion polymerization of monomers. It is said to act also as a stabilizer for compounding natural and synthetic latices. **No. 1322**

Polyurethane elastomers are described in a new booklet covering physical properties, thermal stability, low temperature behavior, adhesion, carbon black level, peroxide concentration, solvent resistance. Many charts are included. **No. 1323**

To measure the dielectric constant and dissipation factor of insulating materials, a new analyzer has been developed which is direct-reading, non-destructive. It can be used to inspect incoming materials or machine output. **No. 1324**

Two new silicone compounds designed specifically for production of sponge are now on the market. Claimed to form uniform, unicellular sponges which surpass organic sponges in resistance to ozone and weathering. **No. 1325**

An adhesive consisting of a cyanoacrylate monomer modified with thickening agent and plasticizer is now available in limited quantity. Requires no heat, excessive pressure or catalyst for curing, contains no solvent. Said to have remarkable rapid set time and strength. **No. 1326**

More than 4,500 unclassified Atomic Energy Commission research reports are listed in the government's semi-annual price list now available. **No. 1327**

A new wire enamel and a new insulating varnish can be combined in electrical systems to withstand hot spot temperatures of 180 C. At the same time, they can be applied and cured at conventional temperatures of about 150 C. Both are polyester-type materials. **No. 1328**

Methallyl alcohol (2-methyl-2-propene-1-ol) can now be obtained in research quantities. It acts as intermediate for methallyl derivatives, can take part in polymerizations. Suggested uses: synthesis of adhesives, resins, rubber. **No. 1329**

Properties of heat resistant, cast high alloys have been compiled in a set of 14 data sheets. Information is complete, up-to-date, includes room- and high-temperature properties, uses, design and fabrication features, structure. **No. 1330**

PRODUCTS OF U.S.I.

POLYETHYLENE RESINS:

PETROTHENE® 200 Series — high quality resins for extrusion, injection and compression molding, film extrusion, paper coating, blow molding.

PETROTHENE 300 Series — special resins for electrical insulation use.

PETROTHENE 560 Series — black, compounded resins for pipe and mulch-film extrusion.

OTHER PRODUCTS:

Alcohols: Ethyl (pure and all denatured formulas); Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL® M, ANSOL PR.

Organic Solvents and Intermediates: Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide, Acetoacet-Ortho-Toluidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate, ISOSEBACIC® Acid, Sebacic Acid, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P.

Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Urethan USP, Riboflavin USP, Intermediates.

Heavy Chemicals: Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertilizer Solution, Sulfuric Acid, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide, Sodium Sulfite, Sodium Sulfate.

Reactive Metals, Oxides and Salts: Zirconium, Zirconium Oxide, Zirconium Tetrachloride, Titanium, Hafnium, Hafnium Oxide, Hafnium Tetrachloride.

Development Chemicals: Ethylaluminum Sesquichloride, Methylaluminum Sesquichloride, Monomethyl Hydrazine, Triethyl Aluminum, Trimethyl Aluminum, Unsymmetrical Dimethyl Hydrazine.

Animal Feed Products: Antibiotic Feed Supplements, BHT Products (Antioxidant), Calcium Pantothenate, Choline Chloride, CURBAY B-G®, Special Liquid CURBAY, VACATONE®, Menadione (Vitamin K_3), DL-Methionine, MOREA®, Niacin USP, Riboflavin Products, Special Mixes, U.S.I. Permadry, Vitamin B_{12} Feed Supplements, Vitamin D_3, Vitamin E Products, Vitamin E and BHT Products.

U.S.I. INDUSTRIAL CHEMICALS CO.

Division of National Distillers and Chemical Corporation

99 Park Avenue, New York 16, N. Y.

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leather tanning oil or a sulfonated oil for fat liquors. In detergents, it is used as a sulfonated oil.

Features: Synthetic fatty oil may replace sperm whale oil in some applications. It will carry as much or more sulfur than sperm oil, and is easily sulfurized and is soluble in petroleum oils. Synthetic has about same viscosity and a higher viscosity index than sperm oil, and reacts much the same when heated or treated chemically. Its odor is not as objectionable as that of sperm oil.

Synthetic fatty oil is easily reacted chemically without forming sludge, gum, or sediment. Material will not dry, it resists oxidation, and wets many metal surfaces.

Description: Light-colored synthetic fatty-type oil has these characteristics:

Cloud Point (°F)	25
Pour Point (°F)	−13
Free Fatty Acid (%)	3.4
Iodine No.	105.0
Viscosity @ 100°F (SSU)	98.2
Flash Point (°F)	470
Unsaponifiable (%)	26.0

(Smithol-25 is product of Chemical Div., Werner G. Smith, Inc., 1730 Train Ave., Cleveland 13, Ohio.)

Check 3989 opposite last page.

Tungsten hexachloride, vanadium trichloride, catalyst, intermediate

Experimental quantities of WCl_6 and VCl_3 are available. Suggested uses: catalysts for polymerization of higher olefins and intermediates for V and W compounds.

(Tungsten hexachloride and vanadium trichloride are products of Electro Metallurgical Co., Div. of Union Carbide Corp., PO Box 330, Niagara Falls, N.Y.)

Check 3990 opposite last page.

For more information on product at left, specify 3991 . . . see information request blank opposite last page.

IF YOU'RE just beginning to manufacture alkyd or polyester resins—or an "old-hand" producer with some production problems still unsolved—Pittsburgh's Technical Service Department may be of real service to you.

As a dependable source of phthalic anhydride, maleic anhydride and fumaric acid, we're well experienced—and *ready*—to assist you with your application problems.

This help goes well beyond "samples and data sheet" on our products—which are always available, of course. We'll be glad to make up sample resins, suggest formulations for your special requirements, and recommend sound processing procedures.

And, when the problem calls for it, our engineers are at your service for a trouble-shooting meeting at your plant. Pittsburgh is *not* a commercial resin producer.

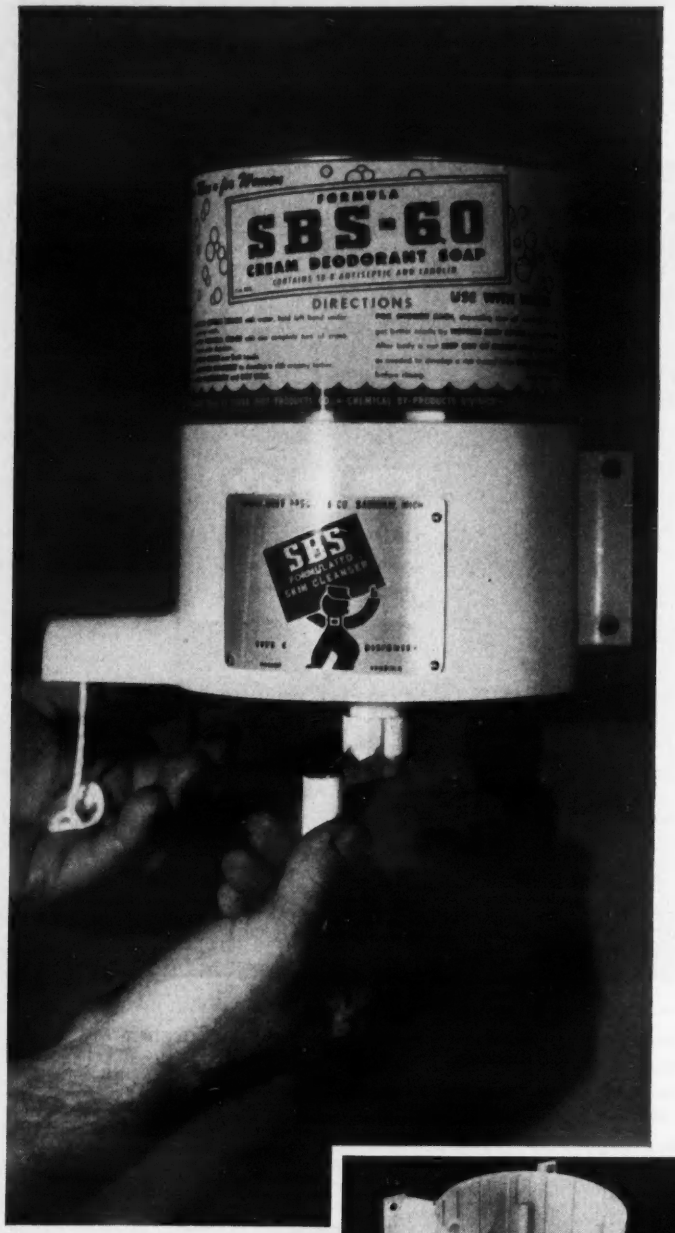
What's your resin production problem? We'd like to help you lick it. *Call or write us the details today.*

COAL CHEMICALS • PLASTICIZERS • PROTECTIVE COATINGS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

Check 3992 opposite last page

Another new development using

B.F.Goodrich Chemical *raw materials*



rigid Geon vinyl makes it rugged, rust-proof and attractive

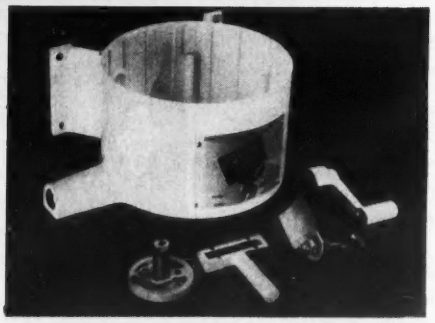
For good looks, durability and cost savings, too, these soap dispensers for plant and office washrooms are made of high impact rigid Geon vinyl.

These dispensers are durable—they resist breakage—and they won't rust, corrode or react chemically with the soaps they dispense. Total cost is less, since no finishing or painting is required, and colors can be molded in the material.

Rigid Geon is also used for piping, fittings, and extruded shapes. Foam Geon makes cushions and safety padding. Protective coatings for steel, paper, upholstery and flexible wire insulation, too, are made from versatile Geon polyvinyl materials.

For technical information on Geon, write Dept. LJ-3 B. F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Soap dispenser housing, crank, plunger, plug and disk are polyvinyl compound molded of rigid Geon by Tube Turns Plastics, Inc., Louisville, Kentucky, for Sugar Beet Products Company, Saginaw, Michigan. Rigid Geon compounds are supplied by B.F.Goodrich Chemical Co.



Geon Polyvinyl Materials

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

Check 3993 opposite last page

Quartet of light absorbers short-stop frisky UV-rays before they do mischief

Plastics, films, coatings are benefited

Uses: In light-colored plastics, coatings, and specialty products.

Features: Absorbers may be used alone or together in products to give varying degrees of protection, considering costs.

Description: Dibenzoylresorcinol (called DBR) is unexcelled in resistance to ultraviolet breakdown. It is very effective in polyester, cellulosic, halogenated and hydrocarbon-type polymers.

5-Chloro-2-hydroxybenzophenone. (HCB) has found use in metallized plastic products. *tert*-Butyl phenyl salicylate (TBS) is completely odorless, is suitable for use in food-packaging films.

Phenyl salicylate (Salol), the fourth member of the series, has been available for a number of years. It is the least expensive of the series and gives a moderate degree of protection.

(UV-light absorbers are products of The Dow Chemical Co., Midland, Mich.)

Check 3994 opposite last page.

Self-polishing floor wax using synthetic resins does not water spot

Uses: Resins are for making self-polishing floor waxes, to be used in place of shellac.

Features: Compounded waxes do not water spot, yet are easily removed when floor must be cleaned.

Description: Synthetic resins for waxes are alkali-dispersible modified alkyds, resulting from the esterification of phthalic anhydride with polyols. Cost is less than that of shellac.

(Waterez 1550 and 1551 are products of Reichhold Chemicals, Inc., RCI Bldg., White Plains, New York.)

Check 3995 opposite last page.

One of safer insecticides, product has broad scope, good residual qualities

Uses: As insecticide.

Features: Toxicology work in progress indicates product will rank as one of the safer insecticides. It has broad scope of insecticidal activity, and good residual properties.

Description: Insecticide is an aryl urethane, 1-naphthyl N-methyl-carbamate. Composition of new product is in no way similar to established insecticides — the phosphates, chlorinated hydrocarbons, arsenicals, and fluorides.

(Sevin is product of Union Carbide Chemicals Co., Div. of Union Carbide Corp., 30 E. 42nd St., New York 17, New York.)

Check 3996 opposite last page.

Economic resin extender

Bulletin describes extender for phenolic and furan resins, which effects savings in production of paper and board products. Tech bul 111 — Polychemicals Div., West Virginia Pulp and Paper Co., Charleston A, S.C.

Check 3997 opposite last page.

High-temperature seals of silicone rubber withstand 600°F

Uses: As a material for O-rings and custom molded parts for high-temperature sealing applications.

Features: Compound is recommended for temperatures as high as 600°F for short period of time.

Description: Shore A hardness of silicone rubber compound is 50, tensile strength is 800 psi, and elongation is about 250%.

(Silicone Rubber Compound 85-138 is product of Parker Rubber Division, Parker-Hannifin Rubber Corp., 17325 Euclid Ave., Cleveland 12, Ohio.)

Check 3998 opposite last page.

Even though the bag bears the same name as for many years past, the Dicalite Filteraid in the bag is not the same—it has been quietly and steadily improved. You can probably prove this yourself, simply by checking your own processing records of, say, ten years back; you will, we believe, find that under comparable conditions today's Dicalite is giving you greater throughput per pound of filteraid, longer filter cycles, and perhaps improved clarity.

This improved performance has been built into Dicalite Filteraids through the steady, day-in, day-out work of our laboratories and engineers. Nothing dramatic—a slight gain here, a small advance there, a little improvement at another stage—a multitude of small refinements whose cumulative total is substantial and impressive. These improvements are demonstrated daily in your own processing... the ultimate test which proves

There Are No Better

Diatomite Filteraids than those produced by...

Dependable GLC GREAT LAKES Dicalite® DIATOMACEOUS MATERIALS

DICALITE DEPARTMENT

GREAT LAKES CARBON CORPORATION • 612 SOUTH FLOWER STREET, LOS ANGELES 17, CALIF.

Check 3999 opposite last page

"NOSEY" says:

THIS column isn't long enough to list all the industrial fields to which FRITZSCHE has made major contributions for the efficient, low-cost control of objectionable odors. But here's a partial list of applications—as many as space can accommodate: fertilizers, fungicides, insecticides, mercaptans, vinyls, plastics, adhesives, embalming fluids, printing inks, wall cleaners, cutting oils, petroleum fuels, air conditioning, textile chemicals, sulphonated oils, waxes, polishes, glues, starches, oils and greases, metal cleaning compounds—and many others. **Yours,** may not be listed, but if it has an odor problem, FRITZSCHE is a sure bet to solve it!

FRITZSCHE Brothers, Inc.

Est. 1871

PORT AUTHORITY BUILDING, 76 NINTH AVENUE, NEW YORK 11, N. Y.

BRANCH OFFICES *and* *STOCKS: *Atlanta, Ga., Boston, Mass., *Chicago, Ill., Cincinnati, O., *Los Angeles, Calif., Philadelphia, Pa., San Francisco, Calif., St. Louis, Mo., Montreal and *Toronto, Canada and *Mexico, D. F.* FACTORY: *Clifton, N. J.*

Check 4000 opposite last page

Suppliers to the industry

Tamms

SILICA — Amorphous; Crystalline and Diatomaceous in proper grind

MAGNESIUM SILICATE — New York state talc 325 mesh and micronized grades

WHITING — Water ground, dry ground, 325 mesh and micronized grinds

DIATOMACEOUS EARTH — Excellent flatting agent giving low angular sheen

CLAYS — Domestic and imported grades

MAGNESIUM CARBONATE — High bulking and re-inforcing pigment

TAMMS INDUSTRIES CO.

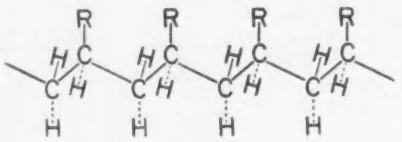
RM-25 228 N. LA SALLE ST., CHICAGO 1, ILL.

Check 4001 opposite last page

Highly ordered ('isotactic') structure gives

POLYPROPYLENE

an unusual combination of properties



If Moplen's polymeric chain could be stretched out on a plane, it could be depicted by this structural representation. The high intramolecular order is called "isotactic." (Dotted lines indicate groups lying below the plane)

What's the secret behind the spectacular combination of properties found in "isotactic" polypropylene, a thermoplastic now commercially available under the trade-name of "Moplen"?

"Stereospecific polymerization of propylene," the manufacturer answers. Actually that's a complicated way to explain that the real secret is in the catalyst. The catalyst is a metallo-organic compound used by Professor Giulio Natta of the Milan Polytechnic Institute, Italy. It

Physical Properties of Moplen Polypropylene

Injection Molded

General Properties		ASTM Method	Moplen
Crystalline melting point (°F) (crystallographic microscope)			329-338
Specific gravity		D792-50	0.90-0.91
Molecular weight (avg)	Moplen M-1		80,000
	Moplen M-2		150,000
Melt index (load of 10 kg instead of 2.10 kg)	Moplen M-1	D1238-52T	20
	Moplen M-2		6
Water Absorption (wt increase)		D570-54T	nil
Physical and Mechanical Properties			
Tensile yield strength (psi)		D638-52T	4300-5000
Elongation at yield (%)		"	10-20
Tensile ultimate strength (psi) (Cross-head: 0.2"/min)	Moplen M-1	"	4300-5000
	Moplen M-2		4600-5400
Ultimate elongation (%)		"	500-700
Tensile modulus (psi)			
Compressive strength (psi)	Moplen M-1	D695-54	9500-11,000
	Moplen M-2		8500-10,000
Stiffness in flexure (psi)	Moplen M-1	D747-50	130,000-170,000
	Moplen M-2		114,000-143,000
Impact strength — Izod			
Unnotched (psi) (½x½" bar)		D256-54T	19
Hardness (Rockwell R)	Moplen M-1	D785-51	90-95
	Moplen M-2		85-90
Thermal Properties			
Softening point (Vicat, 1-kg load)		DIN 57302	>234
Deformation under load (% @ 275°F) (under tension, 210 psi temp increase: 90°F/hr)			<10
Resistance to heat when not subject to strain (°F)			302
Specific heat (cal/gm/°C @ 68-148°F)			0.46
Conductivity (Btu/sq ft/sec/°F/in)			0.95
Brittleness temp		D746-55T	<14
Electrical Properties			
Dielectric constant (10^6 cy)		D150-54T	2.0-2.1
Dissipation factor (10^6 cy)		"	0.0002-0.0003
Dielectric strength (volts/mil)		D149-55T	75-80

- High mechanical strength
- Clarity of films
- 330°F melting point
- No environmental stress cracking
- Excellent vapor barrier
- All other advantages of polyethylene

Professor Giulio Natta of Milan Polytechnic Institute, Italy, whose discoveries in catalytic polymerizations led to the commercial production of Moplen polypropylenes

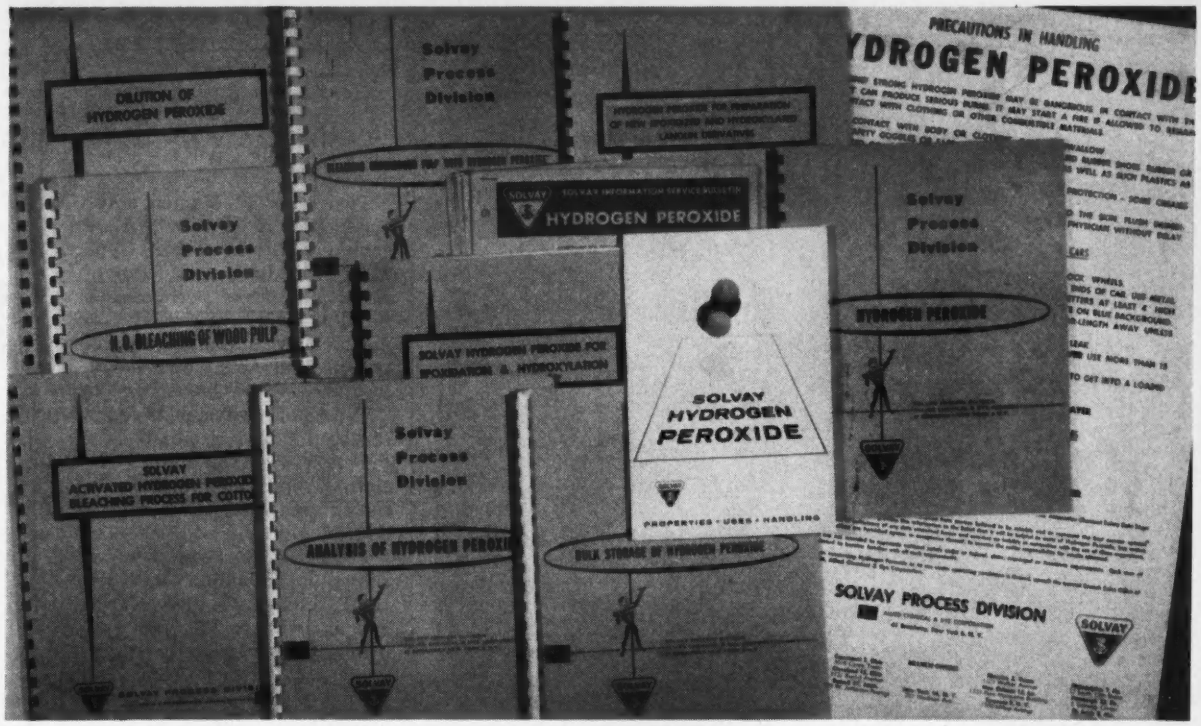
causes the polymerization of propylene (a hydrocarbon with three carbon atoms and one double bond) to take place along a certain, repeated pattern.

Because of the regularity of this pattern, physical properties of the plastic are greatly improved over plastics that have an irregular pattern.

This structure is quite consistent from batch to batch. It is called "isotactic" because the monomer molecules are arranged in the macro-molecules in a quite regular way. This is shown in the illustration.

Specific Properties

Even though Moplen's specific gravity is in the range of 0.9 (relatively low), its physical properties put it on a par with many of the other thermoplastics, and on a volume basis, way ahead. Besides all the advantages of ordinary polyethylenes—including com-



AVAILABLE TO YOU – TECHNICAL DATA ON SOLVAY HYDROGEN PEROXIDE

To help you in your current operations—here is authoritative information on the analysis, uses, handling and storage of SOLVAY Hydrogen Peroxide. These booklets, bulletins and the wall precaution chart have been compiled from accepted sources, from SOLVAY's own research and from 77 years of field experience with chemical consumers in virtually every industrial category. Check the contents of the individual items—then check those that may be helpful to you on the coupon and mail.

HP-1—Solvay Hydrogen Peroxide: Physical properties, chemical reactions, shipping containers, handling, storage. 21 pages.
HP-2—Wall Chart: Precautions for handling hydrogen peroxide.
HP-6—Hydrogen Peroxide Bleaching of Wood Pulp: Applications and methods. 28 pages.
HP-7—Hydrogen Peroxide Bleaching of Groundwood Pulp: Chemicals used, analytical methods, bleaching operations. 15 pages.
HP-9—Hydrogen Peroxide Bulk Storage: Bulk shipping and storage equipment, equipment suppliers. 13 pages.
HP-10—Analysis of Hydrogen Peroxide: Analytical methods, reagents, indicators, standard solutions. 31 pages.
HP-13—Solvay Hydrogen Peroxide for Epoxidation & Hydroxylation: Up-to-date review and bibliography, methods, olefins used, present and potential uses of products. 8 pages.
HP-14—Solvay Activated Hydrogen Peroxide Bleaching Process for Cotton: Process description, operation details, commercial applications, cost and quality comparison. 7 pages.
HP-15—Dilution of Hydrogen Peroxide: How to dilute accurately, equipment and materials needed. 9 pages.

Sodium Nitrite • Potassium Carbonate
Caustic Soda • Calcium Chloride • Chlorine
Sodium Bicarbonate • Ammonium Chloride
Caustic Potash • Chloroform • Vinyl Chloride
Methylene Chloride • Para-dichlorobenzene
Methyl Chloride • Cleaning Compounds • Soda Ash • Hydrogen Peroxide • Aluminum Chloride
Ammonium Bicarbonate • Carbon Tetrachloride
Monochlorobenzene • Mutual Chromium Chemicals
Ortho-dichlorobenzene • Snowflake® Crystals

SOLVAY

SOLVAY branch offices and dealers are located in major centers from coast to coast.

HP-16—Hydrogen Peroxide: Up-to-date review of properties, stabilization, manufacturing methods, purification and concentration (prepared on request for new issue of Encyclopedia of Chemical Technology). 20 pages.
HP-17—Hydrogen Peroxide for Preparation of New Epoxidized and Hydroxylated Lanolin Derivatives: Study of preparation methods and determination of reaction products' characteristics. 8 pages.
NO. 1-56—Information Service Bulletin: Directions and equipment for emptying drums of hydrogen peroxide.
NO. 8-1057—Information Service Bulletin: Directions for unloading tank cars of hydrogen peroxide.
NO. 6-56—Information Service Bulletin: Hydrogen peroxide in oxidation of vat dyes.
NO. 2-57—Information Service Bulletin: Hydrogen peroxide in finishing electroplated surfaces.
NO. 6-657—Information Service Bulletin: Hydrogen peroxide in foam rubber manufacture.
NO. 4-57—Information Service Bulletin: Hydrogen peroxide in shellac bleaching.
NO. 7-957 and NO. 9-1157—Information Service Bulletins: Hydrogen peroxide in wood bleaching.

Allied Chemical

SOLVAY PROCESS DIVISION
ALLIED CHEMICAL & DYE CORPORATION
61 Broadway, New York 6, N. Y. BX-3

Please send me without cost the following SOLVAY Hydrogen Peroxide material:

☐ HP-1 ☐ HP-2 ☐ HP-6 ☐ HP-7
☐ HP-9 ☐ HP-10 ☐ HP-13 ☐ HP-14
☐ HP-15 ☐ HP-16 ☐ HP-17 ☐ NO. 1-56
☐ NO. 8-1057 ☐ NO. 6-56 ☐ NO. 2-57 ☐ NO. 6-657
☐ NO. 4-57 ☐ NO. 7-957

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Company_____
Phone_____
Address_____
City_____ Zone____ State_____

Check 4002 opposite last page

petitive prices—Moplen gives added plusses: high clarity, high melting point, easier moldability.

Two types of Moplen polypropylene have been made commercially available. Type M-1, which has a melt index of about 20, has remarkable fluidity when melted and is particularly suitable for extruded films and blown moldings.

Type M-2 has a melt index of about 6 and is suitable for injection molding and extrusion of pipes and shapes. In the future, other types will be offered.

Physicial characteristics are shown in the table. In addition, films have high clarity and about 25 to 50% less permeability than polyethylene to gases and vapors. Films can be ink printed. There are no solvents for Moplen at room temp; however, aromatic and chlorinated compounds will dissolve it at temperatures greater than 176°F. A mold shrinkage of 3% at room temp is common to both types of Moplen.

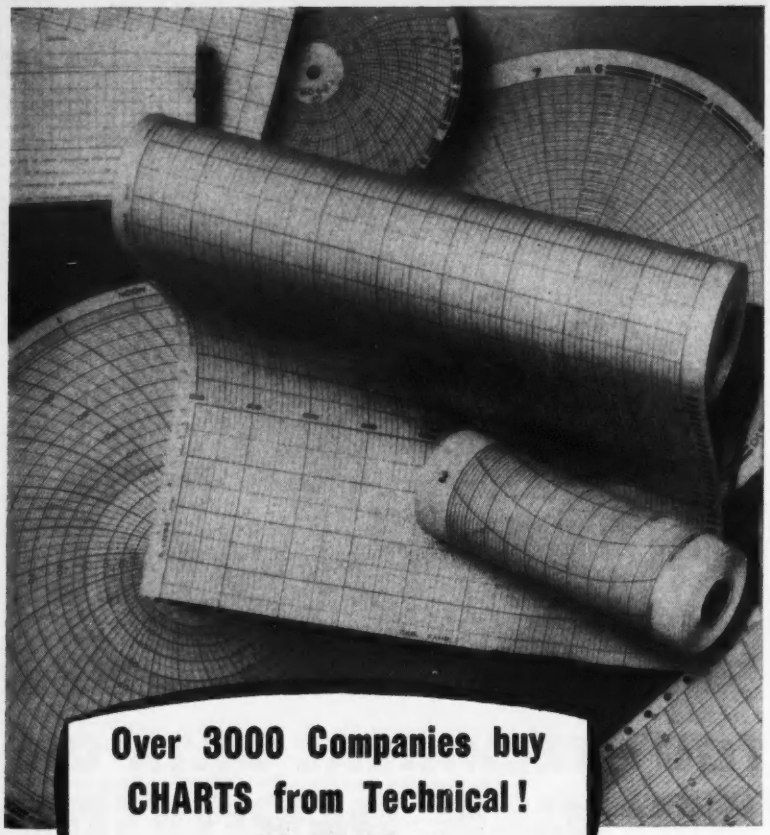
Moplen resists alkalis and acids, even at high temperatures. It exhibits no environmental stress cracking when in contact with solvents and polar substances. Plastic can be vacuum formed, welded, machined, and finished.

Long-range Prospects

In addition to uses in plastic applications—pipe, films, wire insulation, coatings, containers, and molded products —two long-range uses loom on the horizon. The first, and nearest to commercial realization, is in textiles—first industrial products, later consumer products. Second, and not very far along through the research labs, is use of polypropylene as an elastomer, which should find applications similar to those of some specially synthetic rubbers today, but be lower in cost.

(Moplen is a product of Montecatini Soc., Gen., Milano, Italy, and is distributed in the US by Chemore Corp., 21 West St., New York 6, N. Y.)

Check 4004 opposite last page.



Over 3000 Companies buy CHARTS from Technical! DO YOU?

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Obvious economies result from "single source" purchasing of *all* recording charts. Why write a dozen purchase orders to different suppliers when *one* to Technical does the job? Fewer headaches, too, in "following through."

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Check 4003 opposite last page

WE SELL

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INTERMEDIATES

Know ye that these ten DIAMOND chlorinated products are twice as many as were available to you before... that they are readily available... that they can be shipped promptly to your plant.

BENZENESULFONYL CHLORIDE

PARACHLOROBENZENESULFONYL CHLORIDE

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CHLORAL

2, 4, 6-TRICHLOROPHENOL

50% POTASSIUM SALT OF 2, 4, 6-TRICHLOROPHENOL

HEXACHLOROBUTADIENE

PHENOXYACETIC ACID

4, 4'-DICHLORODIPHENYLSULFONE

2, 4-DICHLOROPHENOL

Know ye, also, that Diamond can chlorinate and hydrochlorinate to suit your product needs, whatever they be.

Diamond Chemicals

DIAMOND ALKALI COMPANY
Union Commerce Building
Cleveland 14, Ohio

Check 4005 opposite last page

Methallyl acetate in 97% minimum purity grade

Uses: As a monomer in polymerizations. It is also of interest in preparing methallyl derivatives for specialty rubbers, moldings and laminates, adhesives, protective coatings, polymers, pharmaceuticals, and insecticides.

Features: Its high purity.

Description: Methallyl acetate is supplied in developmental quantities. Introductory price is $1.00 per pound. It has a boiling point of 124.5-125°C and purity is 97% minimum.

(Methallyl acetate is available from Organic Chemicals Div., Food Machinery & Chemical Corp., 161 E. 42nd St., New York 17, N.Y.)

Check 4006 opposite last page.

Fatty acid slide guide

Unique method for showing product specs is slide guide to fatty acids. Includes considerable technical data in handy form. Form 8404 — Wilson-Martin Div. of Wilson & Co., Inc., Snyder Ave., & Swanson St., Philadelphia 48, Pa.

Check 4007 opposite last page.

"I was hoping you'd ask how stable our product is . . ."

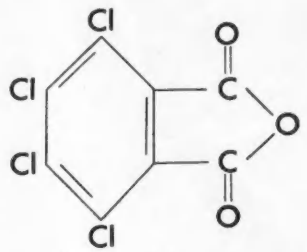
BRIEFS for buyers of

Plastics Additives
Sodium Chlorate
Caustic Soda
Chlorinating Agents

Heat-stable intermediate makes plastics resist fire

If you want to build heat stability into a plastic product, take a good look at this molecule of *tetrachlorophthalic anhydride*, trade-named NIAGATHAL®.

Nearly half its weight is concentrated in four chlorine atoms, providing a very stable compound that won't melt unless you heat it to 254°-255° C.



Translate these properties to read "fire resistance," "heat resistance," "good electrical qualities"—if, for example, you're adding NIAGATHAL to a polyester resin.

It's most effective in polyesters containing pigment or other filler—lets you load as much as 22% stable chlorine into such resins. When you do this, you come up with a polyester that's inherently, permanently self-extinguishing.

To help you evaluate this chemical, we've put together, in bulletin form, several published papers reviewing its properties and solubilities, its many reactions and suggested uses, as well as uses of derived compounds. To get a copy, just check the coupon for *Bulletin 46*.

If you'd like an evaluation sample of NIAGATHAL, *please write on your business letterhead.*

Sodium chlorate: solids by tank car

Ever hear of a *solid* chemical being shipped by *tank car?*

Purchasing man's nightmare? Not at all. In fact, it's the way many of our customers buy *sodium chlorate,* for safety's sake.

How is the car unloaded? Simply by pumping hot water into it, and piping the resultant slurry into a dissolving tank.

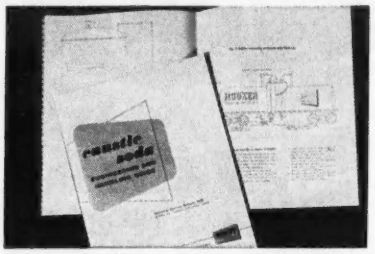
In case you're using, or plan to use, sodium chlorate, you can get full details on this standard unloading method by writing us.

Experienced technical help is one of the advantages you gain by ordering your sodium chlorate from us.

Some others:

1. A material of 99.5% minimum purity.
2. Swiftest service you can get in East and South, from our two Oldbury Products plants at Niagara Falls, N. Y., and Columbus, Miss.
3. Dependable supply. Currently the nation's largest producer, we're expanding still further to meet tomorrow's needs.

For more facts on how we can help you process safely and profitably with sodium chlorate, ask your Hooker salesman or write us today.



40-page manual tells how to handle caustic soda

Written for engineers, this 40-page Hooker manual sums up newest techniques for handling and storage of liquid caustic soda.

Contents include detailed diagrams of equipment; a section on materials of construction; recommendations for unloading, diluting, piping, and storage; and a section on safety precautions and first aid.

For a copy, check the coupon for Hooker Bulletin 102, *Caustic Soda Engineering and Handling Guide.*

Sulfur chlorides for low-cost chlorination

As chlorinating agents, the sulfur chlorides provide you with low-priced sources of chlorine which are relatively easy to handle and store.

Sulfur monochloride, S_2Cl_2, is a definite compound with well-defined properties. This is not true of *sulfur dichloride,* SCl_2. In chlorination reactions, sulfur dichloride may be considered the equivalent of chlorine dissolved in sulfur monochloride.

In general, you can use sulfur monochloride and chlorine wherever sulfur dichloride is required. There are certain advantages in doing so, since sulfur monochloride can be purified by distillation and stored without gas pressure developing in the container.

Hooker sulfur monochloride is a yellow to slightly reddish heavy liquid containing 52.0 to 52.5% chlorine. Hooker sulfur dichloride, a brownish-red liquid, contains 66% min. chlorine.

For some helpful tips on chlorination with these and other Hooker chlorinating agents (chlorine, sulfuryl chloride, thionyl chloride, hydrogen chloride), check the coupon for Bulletin 328-A, *Hooker Chlorinating Agents.* You can use the coupon also to request technical data sheets on any of these chemicals.

for your file . . . new data on:

Sodium chlorate, $NaClO_3$ (OLDBURY®)
Potassium chlorate, $KClO_3$ (OLDBURY)

New data sheets on these two chemicals have been released. For copies, check the coupon on this page.

For more information on chemicals mentioned on this page, check here:

- ☐ NIAGATHAL (tetrachlorophthalic anhydride)
- ☐ Caustic Soda (data sheet)
- ☐ Bulletin 102, *Caustic Soda Engineering and Handling Guide*
- ☐ Sodium Chlorate
- ☐ Potassium Chlorate
- ☐ Sulfur Monochloride
- ☐ Sulfur Dichloride
- ☐ Sulfuryl Chloride
- ☐ Hydrogen Chloride
- ☐ Chlorine
- ☐ Bulletin 328-A, *Hooker Chlorinating Agents*
- ☐ New list of products —Bulletin 100-A

Clip and mail to us with your name, title, and company address. (*When requesting samples, please use business letterhead.*)

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Niagara Falls Tacoma Montague, Mich. New York Chicago
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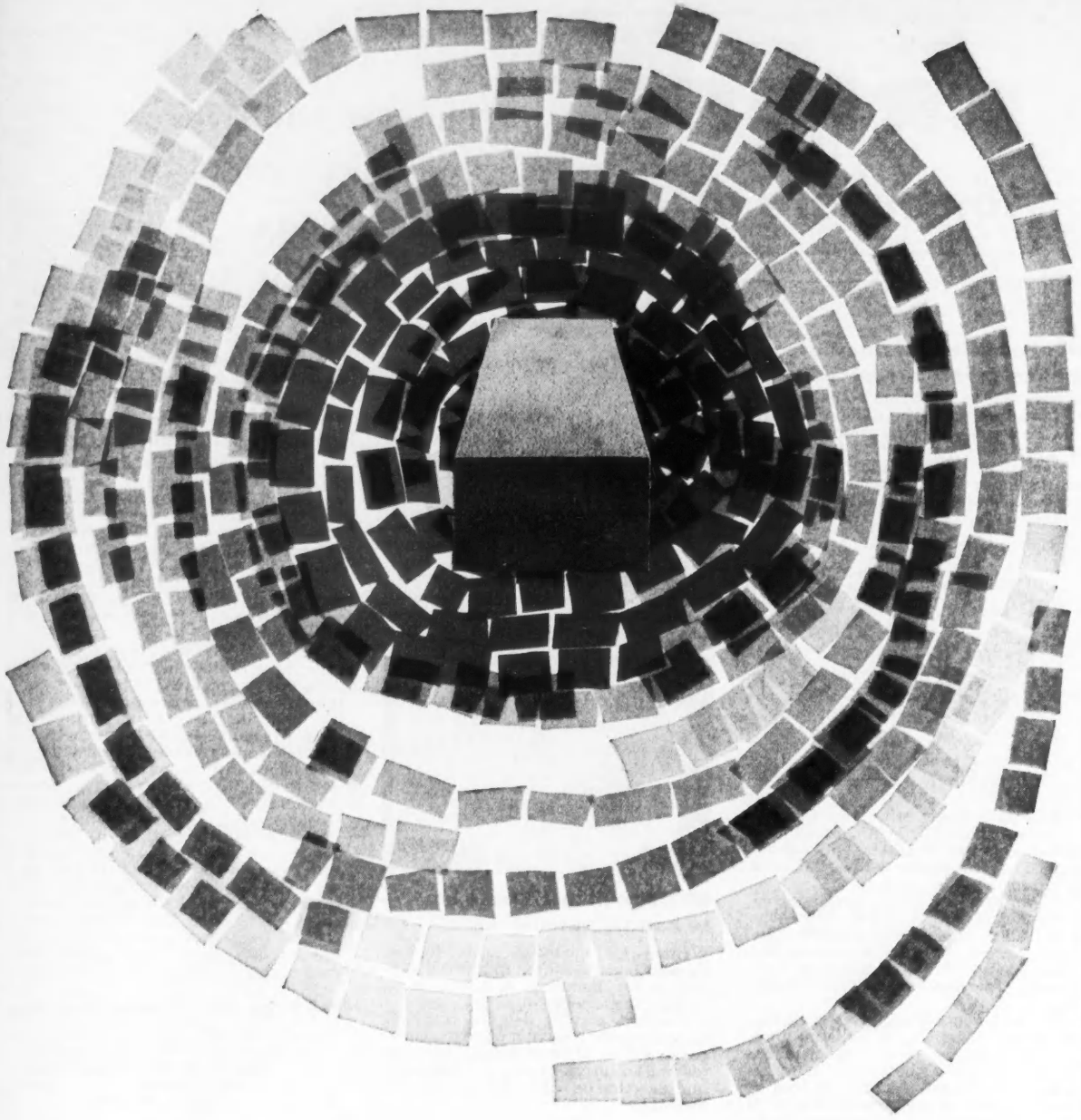
In Canada: Hooker Chemicals Limited, North Vancouver, B. C.

HOOKER CHEMICALS PLASTICS

Check 4008 opposite last page



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and get refractories or refractory castables that work hardest, longest! Refractories are vital to production in almost every industry. To give industry the best refractories possible, more and more refractory manufacturers have turned to Alcoa® Aluminas. They've found that refractoriness and durability increase in direct proportion to the amount of alumina they use. They know it pays to mix imagination and engineering with Alcoa Aluminas . . . for the best in refractory performance at reasonable cost.

Alcoa is not a source for finished refractories, but does supply aluminas to manufacturers of the best refractories. For their names, write: ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 705-C Alcoa Building, Pittsburgh 19, Pennsylvania.

For finer products . . . let Alcoa add new directions to your creative thinking!

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"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

Check 4009 opposite last page

CHEMICAL MATERIALS

Minute dosage kills slime in water

Slimicide has low mammalian toxicity

Uses: To kill slime growths, especially in cooling towers.

Features: Slimicide works quickly and economically. It operates at very low concentrations and its inherent low toxicity to animal and plant life does not create problems. It does not increase corrosion rates.

Description: El-Tox is a colloidally dispersed metallo-organic. It is 5.5% active ingredient; sp gr is 1.0 approximately. It has unusual ability to be attracted to the surface of slime cells, practically all the compound that is added to the water eventually ends up sticking to the slime particles. This explains its high efficiency in small concentrations.

For example, large cooling towers that are heavily slimed should be treated at a level of one gal/10,000 gal of water capacity. For maintenance, half this dose once a week is sufficient.

On non-cycling systems, such as sea water cooling systems, slimicide is diluted and added into system at a rate of one quart/million gallons.

(El-Tox is a product of United Chemical Corp. of New England, 45 Seekonk St., Providence 6, R.I.)

Check 4010 opposite last page.

Alkyd molding compound facilitates low cost, high volume use

General purpose, glass reinforced alkyd molding compound permits low-cost, high-volume production of structural items and housings. Molded products have good surface appearance, permanent color, high-impact strength, rigidity, and light weight.

(STRalkyd is a product of Panelyte Div., St. Regis Paper Co., 150 E. 42nd St., New York 17, New York.)

Check 4011 opposite last page.

Alkyl boric acid trio

Uses: Suggested as bacteriostats and fungistats, as intermediate for transparent films and fibers, and as detergents.

Features: Compounds are much weaker acids than unsubstituted boric acid and are stable in water solution. Aqueous solutions have low surface tensions.

Description: Chloropropyldihydroxyborane, $ClC_3H_6B(OH)_2$, is a white crystalline material. Dihydroxydodecylborane, $C_{12}H_{25}B(OH)_2$, and dihydroxynonylborane, $C_9H_{19}B(OH)_2$, are colorless liquids.

(Alkyl boric acids are products of Callery Chemical Co., 9600 Perry Hgwy., Pittsburgh 37, Pennsylvania.)

Check 4012 opposite last page.

Unsaturated fatty alcohols for pharmaceuticals, cosmetics

Uses: For pharmaceutical, cosmetic, nutritional uses.

Features: The poly-unsaturated alcohols on which products are based are digestible, non-toxic, stable substances.

Description: Principal component of Unidol 400 is linoleyl alcohol; of Unidol 900 is linolenyl alcohol.

(Unidols are products of Archer-Daniels-Midland Co., 700 Investors Bldg., Minneapolis 2, Minn.)

Check 4013 opposite last page.

Molding compound

Digest-size 40-page catalog describes seven reinforced polyester molding compounds offering high-impact strength, and unusual electrical- and chemical-resistant qualities. Catalog suggests compounds can replace metals and other plastics in many applications. "Reinforced Molding Compounds" — Chemicals Div., Atlas Powder Co., Wilmington 99, Delaware.

Check 4014 opposite last page.

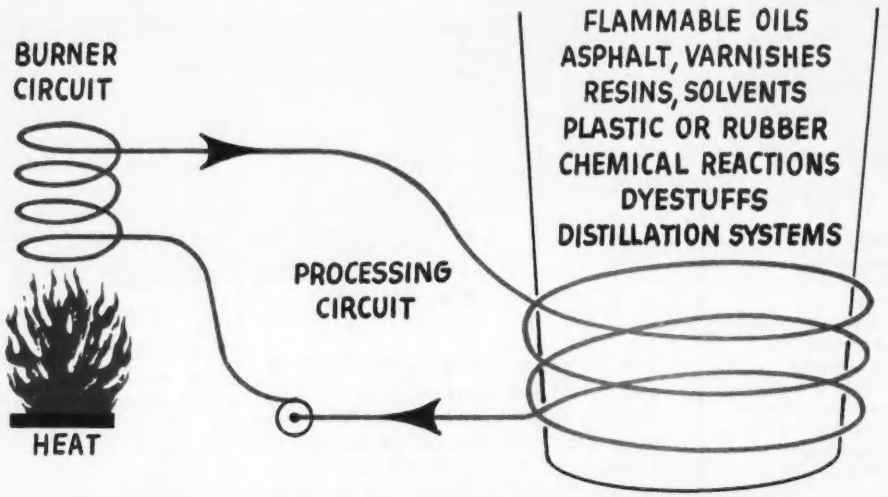
NOW... **NON-PRESSURIZED** LIQUID-PHASE HEAT TRANSFER SYSTEMS THAT OPERATE UP TO **600° F.**

AROCLOR 1248

✔ **Operates at atmospheric pressure** ... cuts installation and maintenance costs of expensive pressurized systems.

✔ **Fluid is fire resistant** ... increases safety by eliminating direct-firing and heat transfer with flammable fluids.

HERE'S PIN POINT CONTROL TO WITHIN 2° F.



The Equipment ... capacities can range from small portable units—usually electrically heated—to large gas- or oil-fired units generating from 250,000 to over 10,000,000 B.T.U.'s per hour. Circuits are closed, forced-circulation. Compact design saves space, minimizes installation and maintenance costs.

The Fluid ... Aroclor 1248 is a highly stable chlorinated polyphenyl; does not support combustion up to its boiling range 652° to 725° F.; is non-corrosive. Aroclor 1248 operates in most systems four to seven years without replacement.

Aroclor: Reg. U. S. Pat. Off.

Contact Monsanto for SOURCES of AROCLOR 1248 heating systems

Monsanto

Where Creative Chemistry Works Wonders For You

MONSANTO CHEMICAL COMPANY, Organic Chemicals Division
Department 1F-1, St. Louis 24, Missouri
Gentlemen:
Please send: ☐ Technical information about Aroclor 1248
☐ Names of designers and manufacturers of Aroclor 1248 operated equipment

Name.....
Firm..... *Address*.....
City..... *State*.....

Check 4015 opposite last page

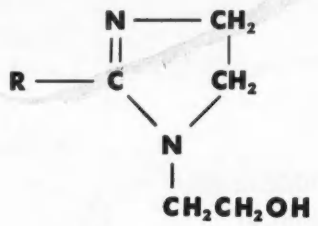
Nalcamine IDEA LIST

● These are a few of the characteristics and possible uses of Nalcamines that may give you profitable ideas for their application to your products:

- ☐ **Cationic surface-active agents**
  - **—can be made either water- or oil-soluble.**
  - **—Wetting agents.**
  - **—Foaming agents.**
  - **—Emulsifiers and demulsifiers.**
  - **—Anti-corrosion agents.**
  - **—Anti-static agents.**
- ☐ **React on an equimolar basis to form salts.**
  - **—Adjustable oil and water solubility.**
  - **—Excellent stability at low pH.**
- ☐ **Selectively adsorbed on many different surfaces in both oil and water systems.**
  - **—Improve asphalt coatings; better resistance to water stripping.**
  - **—Change water accepting surfaces to water repelling surfaces.**
  - **—Provide dispersion and lubricity in rubber, plastics, asphalt.**
  - **—Improve paint bonding and water repellancy.**
  - **—Increase efficiency of flotation processes.**
- ☐ **IF you want wetting, dispersion, foaming or emulsification as "built-in" characteristics of your products, check with Nalco on the suitability of Nalcamines to do the job.**

NALCAMINES are of the imidazoline (glyoxalidine) class of cyclic tertiary amines, now being manufactured with controlled purity and uniformity for practical commercial use.

TYPICAL Nalcamine structure where R is a long hydrocarbon chain.



NOW the exciting possibilities of cyclic tertiary amines are *practical* for adaptation into commercial products with the use of Nalcamines. Control of purity and uniformity, combined with practical pricing, put the Nalcamines solidly into the class of economically-sound working chemicals.

Write today for complete data and prices. Laboratory samples or tank car lots are available promptly.

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6294 West 66th Place • Chicago 38, Illinois
Telephone: POrtsmouth 7-7240
CANADA: Alchem Limited, Burlington, Ontario
NORTHWESTERN UNITED STATES, HAWAII and ALASKA
The Flox Company, Inc., Minneapolis 3, Minnesota
ITALY: Nalco Italiana, S.p.A.
WEST GERMANY: Deutsche Nalco-Chemie GmbH
SPAIN: Nalco Espanola, S.A.

Nalco® PRODUCTS

Serving Industry Through Practical Applied Science

Check 4016 opposite last page

CHEMICAL MATERIALS

Economical monomer

Operating procedures, physical properties, specs, applications, polymerization techniques, and analytical procedures concerning vinyl acetate monomer are in 16-page booklet, F-7575 — Union Carbide Chemicals Co., Div. of Union Carbide Corp., 30 East 42nd St., New York 17, N.Y.

Check 4017 opposite last page.

Silicone rubber duo are room-temp vulcanizing

Excellent ozone, weather resistance, good electrical properties

Uses: As room-temp vulcanizing (RTV) silicone rubber compounds.

Features: Compounds offer excellent ozone and weathering resistance, flame resistance, low-temp flexibility, and performance up to 500°F. They possess good electrical properties.

Description: A red compound, 81712 has extremely low shrinkage. It is suggested for model making, sealing, and other uses where accuracy and dimensional stability are important.

Compound 81726, a beige material, is harder and tougher than 81712 but not as elastic. It shrinks about 2% during cure, several times more than 81712.

Both are easy to handle and offer good storage stability.

(Compounds 81712 and 81726 are available from Silicone Products Dept., General Electric Co., Waterford, N. Y.)

Check 4018 opposite last page.

Obtain high-strength, flexible vinyl bonds on nylon base fabric

Trio of coatings are applied by one- or two-coat system

Uses: In the coatings and laminating industry, for applying vinyl plastisols and or-

TC TENNESSEE CORPORATION

INDUSTRIAL CHEMICALS

We mine Copper, Sulfur, Iron and Zinc and are basic producers of their chemical derivatives. Our technical know-how and basic position in these minerals is your assurance of exacting quality control, strict uniform consistency and a plentiful supply.

COPPER	
COPPER SULFATE	Industrial Crystals and all common grades.
MONOHYDRATED COPPER SULFATE	35% Copper as metallic packaged in steel drums at no extra cost.
COPPER CARBONATE	55% Copper as metallic. Light and dense grades.
CUPRIC CHLORIDE	37% Copper as metallic. Available in polethylene-lined drums or bags.
CUPRIC OXIDE	Minimum 76% Copper as metallic. Technical grade . . . NOT A BY-PRODUCT.
SULFUR	
SULFURIC ACID	Various strengths and grades 60° through the Oleums. Available in tank cars or tonnages.
LIQUID SULFUR DIOXIDE	Highest commercial quality, available in tank cars, tank wagons, ton cylinders and 150-lb. cylinders.
CHLOROSULFONIC ACID	Iron less than 1.0 ppm as loaded. Water white. Delivered in glass-lined tank wagons, also in stainless steel drums.
SODIUM HYDROSULFITE	T-C HYDRO is a dry, white, free flowing, crystalline powder of uniform particle size and structure. It is dust free, assuring highest stability and uniformity.
PARA TOLUENE SULFONIC ACID, ANHYDROUS	Other organic Sulfonic Acids.
IRON	
FERRIC IRON SULFATE	Partially hydrated, free flowing granular form. Available in bags or bulk.
ZINC	
MONOHYDRATED ZINC SULFATE	36% Zinc as metallic. White, free flowing powder.
ZINC OXIDE	Secondary Zinc Oxide.
MANGANESE	
MANGANESE SULFATE	Designed specifically for inclusion in mixed fertilizer.
MONOHYDRATED MANGANESE SULFATE	93% Mn SO_4, H_2O. Highest purity, technical grade . . . NOT A BY-PRODUCT.
MANGANOUS OXIDE	Minimum 48% Manganese as metallic. Feeds, fertilizers, spray or dust grades.

Samples, specifications and detailed information upon request.

TENNESSEE TC CORPORATION

617-29 Grant Building, Atlanta, Georgia

Check 4019 opposite last page

ganosols to nylon base fabric.

Features: Now available, are three coatings which have been designed for obtaining high-strength, flexible bonds of film to nylon and other synthetic fabrics.

Adhesion values for plastisol film exceed 20-lb peel strength per two-inch width.

Description: Trio of vinyl coatings can be applied by one-coat system. For more critical applications, a two-coat system will give better color, consistently higher bond values over a wider range of weave constructions, and can be fused in less time.

(Arcco-brand coatings are products of Chemical Div., Borden Co., 350 Madison Ave., New York 17, N. Y.)

Check 4020 opposite last page.

Need low-temp catalyst? Put hydroperoxide in resin recipe

Uses: As polymerization catalyst at both high and low temperatures.

Features: Where low-temperature catalyst is required, material can be used by adding metallic or amine promoters.

Description: *p*-Menthane hydroperoxide is a stable, non-volatile liquid hydroperoxide. With general-purpose polyester resins, *p*-menthane hydroperoxide exhibits a low peak exotherm at 180°F.

(*p*-Menthane hydroperoxide is product of Lucidol Div., Wallace & Tiernan, Inc., 1740 Military Rd., Buffalo 5, N. Y.)

Check 4021 opposite last page.

Synthetic silica info

Silica gels, hydro gels and other synthetic silicas are in four-page bulletin. Continuous process, producing either small or large quantities of standard or special compounds, is also described. Bul MAC — American Industrial Chemical Co., Div. of Amerace Corporation, Cooper Park, Butler, New York.

Check 4022 opposite last page.

SNOW JOB.....

By Snow Generator or By Direct Injection,
The Liquiflow CO_2 System Insures

ABSOLUTE PRODUCT TEMPERATURE CONTROL IN PULVERIZATION

- Assures the uniform refrigeration required in size reduction on chemicals, resins, plastics, pharmaceutical products, antibiotics, sugar, spices and heat sensitive products.
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Check 4023 opposite last page

ELI LILLY AND STANDARD OIL

thirty years as good neighbors in Indianapolis

L. J. Klingaman, Director of Eli Lilly Purchasing Division, and H. J. Kaufman, Standard Oil Regional Manager, stand before historic building on Lilly plant grounds. The Lilly Company had its beginning in this building more than 67 years ago.

For more than 30 years Eli Lilly and Company and Standard Oil have been industrial neighbors in Indianapolis. Standard Oil supplies petroleum products to this leading pharmaceutical manufacturer's McCarty Street plant and its laboratory at Greenfield, Indiana, a short distance from Indianapolis.

In the course of these years as a supplier, Standard Oil technical service has accompanied the sale of petroleum products. This service has been supplied by men with experience in engineering and in the use of petroleum products. Standard's man currently on the Lilly account is John T. Stark, a native of Indianapolis. For five years, ever since graduating from Brown University with a degree in chemistry, John has been calling at Eli Lilly. He had 17 weeks off this assignment in 1953 to attend the Standard Oil Sales Engineering School, where he received special training in the application of petroleum products.

But underneath this relationship between supplier and customer—the business dealings, the products bought and products sold—there has something even deeper, something that is very good. It is the respect two industrial companies have for one another, which has endured to mutual advantage for 30 years.

Perhaps your company has been a customer of Standard Oil's for many years. If not, we should like the opportunity to serve you as we have served Eli Lilly. We have 20 division offices in 15 Midwest and Rocky Mountain states. Call any of these offices. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY
(Indiana)

THAT'S INTERESTING

Blocks mildew

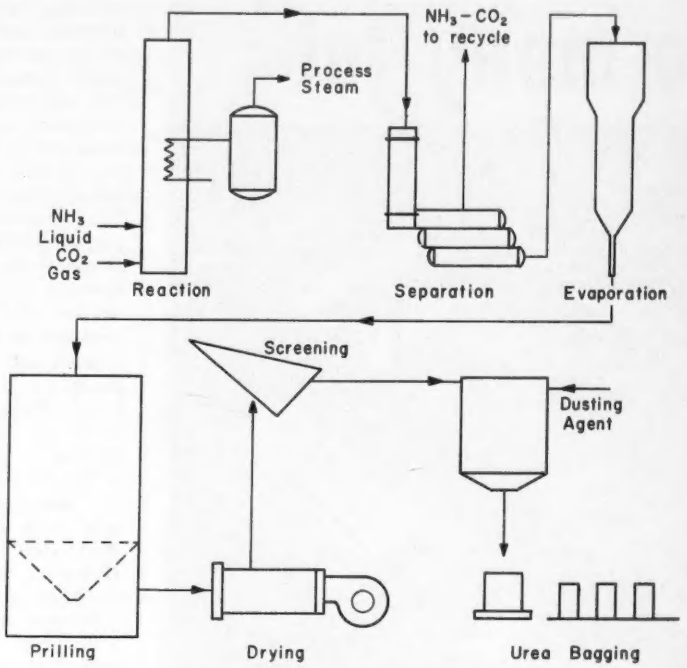
Mildew, a fungus growth on soiled fibers that can weaken, discolor, and eventually destroy cloth, is a particular enemy of linen-service people. It can reduce the service life of rental linens as much as 20%. It may cost as much as 20c to remove stains from 100 pounds of linen.

Now chemistry is combating this menace by offering protection against mildew damage. Cost: 1½c for each 100 lb of linen. Chemical is sodium pentachlorophenate and is available as a powder, in pellets, or in form of brickets from Monsanto.

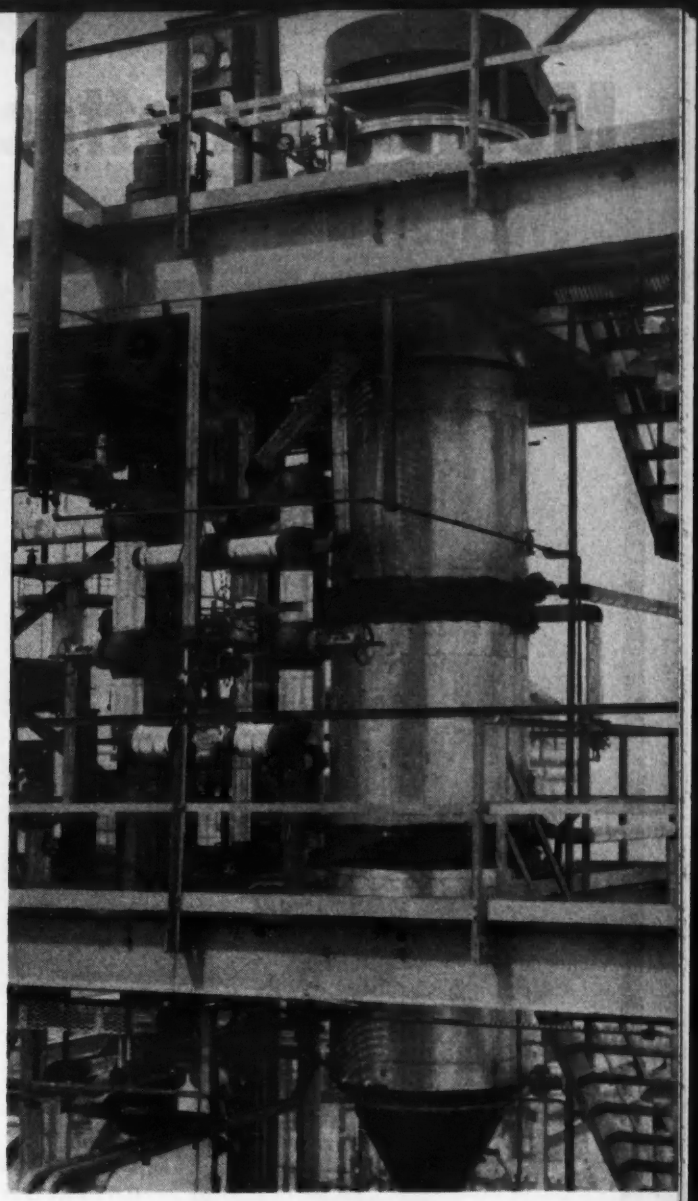
Painting aid

An aid to home handy men has been put on the market. Clean up after do-it-yourself paint jobs can be reduced by using gloves and a pan cover of polyethylene. Secured at the wrist, flexible, one-finger gloves keep paint off of hands. The cover slips over paint pan. Both items are throw-aways.

For more information on product at left, specify 4024 see information request blank opposite last page.



Simplified flow diagram of major steps in production of urea from liquid ammonia and gaseous carbon dioxide



Falling-film evaporator concentrates urea solution to more than 90% solids, continuously, in one pass

At Lima, Ohio, years of research and development, and more than six years of commercial operating experience abroad, culminated in American translation of . . .

INVENTA-VULCAN PROCESS FOR HIGH-GRADE UREA

THEODORE W. WETT, Assistant Editor
With D. G. STEVENS, Manager
Manufacturing Div.
Sohio Chemical Co.

Physical properties of urea

Molecular weight	60.06
Melting point, °C	132.7
Specific gravity	1.337
Heat of fusion, cal/gm	57.8
Heat of soln, cal/gm	57.8

Sohio's specifications for urea

pH	7-9.8
Water %	0.5
Ash ppm max	35
Iron ppm max	2
Free ammonia ppm max	175
Color, APHA	10
Turbidity ppm max	20

First urea unit to be built in the United States using Swiss Inventa-Vulcan process is operating at $17-million Sohio petrochemical plant in Lima, Ohio. This plant makes use of turbulent, falling-film evaporator, prior to prilling, that helps assure output of uniform high-grade product.

In Sohio's plant, total daily production of anhydrous ammonia, nitric acid, urea solutions, and dry ice or liquid CO_2 totals 1,040,000 pounds.

In urea production, rated at 120 tons per day, liquid ammonia and gaseous carbon dioxide are fed to synthesis reactor where they are subjected to temperature in range of 160 to 190°C and pressure of 170 to 200 atmospheres. Under these conditions ammonium carbamate is formed with liberation of considerable heat. About half of carbamate dehydrates to form urea immediately. Product leaving reactor is a liquid mixture containing water, urea, and carbamate.

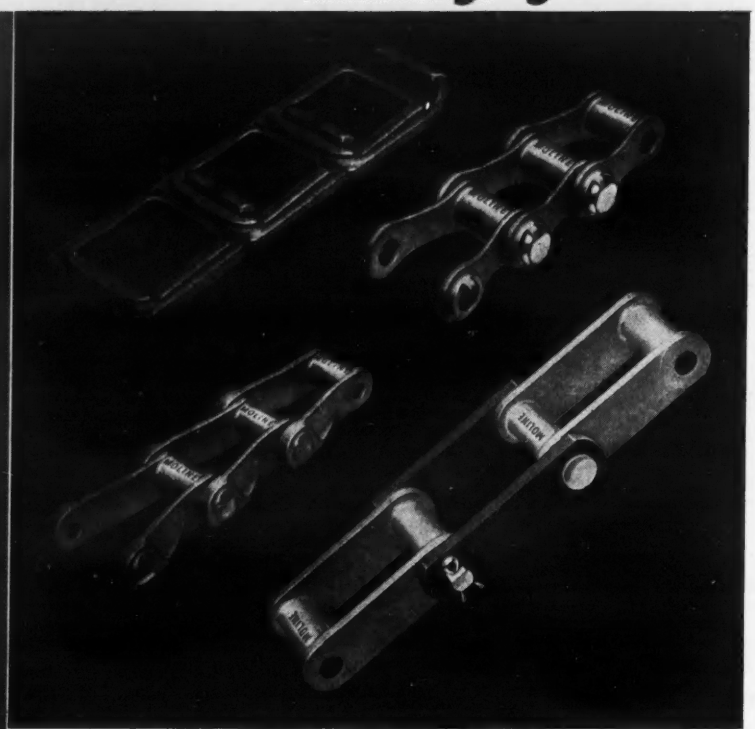
Mixture undergoes a large reduction in pressure to decompose most of unconverted carbamate in primary decomposer. After a further pressure reduction, mixture flows to secondary decomposer where remaining carbamate is decomposed to ammonia and carbon dioxide.

Carbamate-free solution of urea and water is concentrated in a turbulent, falling-film evaporator. This unit dehydrates solution to more than 90% solids continuously, in one pass, and in a few seconds. Unit operates at relatively low temperatures so as to avoid product degradation.

Evaporation takes place in a jacketed vertical tube approximately 15′ in length and 3′ in diameter. A controlled-speed

Moline link attachments adapt Moline Chains to many jobs

STANDARD ATTACHMENTS
Only a few of the wide variety of Moline Chain attachments are shown here.



Conveying and Elevating

THERE IS NO LIMIT to the number of jobs which can be handled by Moline Chains. With the wide variety of standard link attachments available, the possibilities for adaptation are endless. Both right and left hand types are made to the exact size and pitch of the regular chain links.

With Moline Chain, equipped with standard attachments, you can push, pull, scrape, elevate and carry an endless variety of materials and objects.

At the same time you can cut your overall chain costs because Moline Chains and attachments are engineered for maximum efficiency... trouble-free performance... and long life. Only Moline Chains are triple-tested to guarantee maximum quality control.

Write for descriptive literature today!

Moline MALLEABLE Chains

Specializing in the manufacture of chains

LEADER FOR 80 YEARS

MOLINE MALLEABLE IRON COMPANY
St. Charles, Illinois

Check 4025 opposite last page

agitator rotor extends down through entire axis of tube. Rotor blades come within 1/32" of chamber wall to keep film circulating evenly with a turbulent action. Solution is pumped into top of evaporating section and is whirled against heated wall by rotor blades. Evaporation takes place rapidly and uniformly during continuous curvilinear flow of material from top to lower end where urea concentrate is removed.

Urea concentrate from evaporator is pumped to prilling tower. Prills are dried, cooled, screened, dusted with a conditioning agent, and bagged.

Tail gases from decomposers are usually sent to nitric acid and ammonium nitrate plants for ammonia recovery. However, separate gas recycle facilities are provided.

Success of process rests on a number of factors. Serious corrosion problems have always attended commercial production of synthetic urea, particularly in reactor where liquid urea melt and carbamate at high temperatures caused rapid deterioration of equipment. Use of lead or silver linings was not deemed satisfactory because of probable high cost of maintenance and replacement plus contamination of product. Inventa reactor utilizes a metallic

"Watch Jones! I thought he was working yesterday — he was playing solitaire!"

alloy lining that does not cause heavy-metal contamination and is expected to last 10 to 15 years. Critical expansion valves and piping are also of a special material. Evaporator which dehydrates urea solution and controls biuret content is constructed of 20% clad stainless.

Ratio of NH_3 to CO_2 as they are fed to reactor is regulated to permit recovery of most of heat of reaction. This heat is used to produce process steam.

(Turba-Film Processor used in urea production is a product of Rodney Hunt Machine Co., Orange, Mass.)

Check 4026 opposite last page.

(For more information on Inventa-Vulcan process contact Vulcan Engineering Div., Vulcan-Cincinnati, Inc., 120 Sycamore St., Cincinnati 2, Ohio.)

(Conveyor and drying equipment were supplied by Link-Belt Co., Prudential Plaza, Chicago 1, Ill.)

Check 4027 opposite last page.

Pumps liquid metals at 1600° F — 5000 gpm

Electro-magnetic principle used

Leak-proof, liquid-metal pumps capable of pumping from 150 to 5000 gpm at temperatures up to 1600°F are available. Designed to circulate liquid metals through hermetically sealed system of certain nuclear power plants, the units operate on electro-magnetic principle, same as pumps installed on atomic submarine, Nautilus.

Operating temperature of pump motor is independent of temperature of liquid metal being circulated. In recent test, a 15-brake-horsepower unit ran 3500 hours at temperatures over 1000°F, with no damage to pump.

(Liquid-metal pumps are being manufactured by Atomic Equipment Department, Westinghouse Electric Company, Pittsburgh, Pa.)

Check 4028 opposite last page.

B.F.Goodrich

How Koroseal helps cut cost of nickel-plating jewelry

THE Victory Polishing and Plating Company of Providence, Rhode Island specializes in the nickel-plating of jewelry, turning out such items as nickel-plated cuff links, tie bars, necklace chains and pins. The nickel solution used is highly corrosive and runs at an almost constant 130°F. Ordinary "acid-resistant" hoses continued to fail—they couldn't take the combined assault of corrosion and heat.

Then, in the summer of 1956, the company installed B.F.Goodrich Koroseal rigid polyvinyl chloride pipe. Result: absolutely no maintenance is required, and close examination shows no apparent wear. This company is replacing all of its "acid-resistant" hose with Koroseal pipe, and has lined all its acid storage tanks with rigid Koroseal PVC plate.

Versatile Koroseal has answered countless problems for alert manufacturers. Koroseal is unaffected by most alkalies and acids, and is completely inert in the presence of oil, alcohol, and salt solutions.

Exceptionally easy to install, Koroseal PVC can be threaded, cut, welded or drilled. It has excellent insulation properties, will not support combustion, and never needs painting.

Find out how this light, inexpensive, long-wearing pipe can make your operations more efficient. Fill in and mail the coupon on the right. *B.F.Goodrich Industrial Products Company, Marietta, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS CO.
MARIETTA, OHIO

B.F.Goodrich Industrial Products Co.
Dept. CP-3, Marietta, Ohio.
Please send me free booklets on:
☐ Rigid Koroseal Pipe
☐ Rigid Koroseal Sheet

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Company_____
Address_____
City_____ Zone____ State_____

Koroseal —T.M.Reg. U.S. Pat. Off.

Check 4029 opposite last page

Ultra-pure niobium made by cage-zone refining

Niobium, classified as a "rare metal" for over 150 years, may be on the threshold of becoming a valuable structural metal. Big step in this direction was taken recently when Westinghouse scientists developed a method for purifying the metal.

Producing the material in its purest possible form is essential in order to obtain a basic understanding of the properties that make it of interest as a high-temperature

In the refining process, the metal bar melts from the inside out

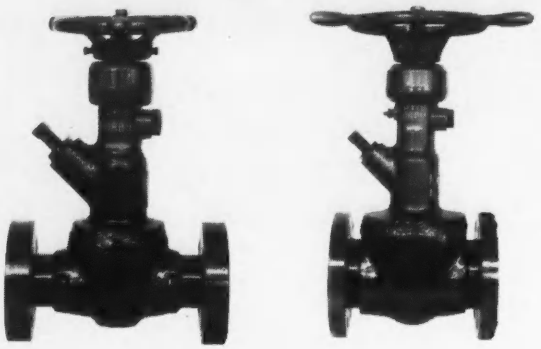
structural metal. The new technique has produced the purest niobium ever made on a scale large enough for realistic scientific study of the metal.

Process involves "cage-zone melting". A rectangular bar of impure niobium stands vertically on a movable platform, which can move the bar up and down inside a coil of copper tubing. The coil and platform are enclosed in a sealed vessel having a vacuum only four billionths of the atmosphere.

When a strong, high-frequency electrical current is sent through the coil, corresponding currents are induced in the bar, which melts from the inside out. The four corners of the bar do not melt, but form a "cage" within which the molten niobium is trapped.

As the bar rises through the coil, a molten zone of niobium travels down the bar, melting the bar. Successive

A LOGICAL STEP



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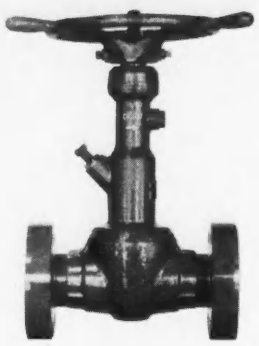
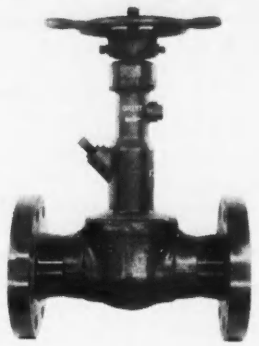
WAREHOUSES: HOUSTON, TEXAS, 407 Velasco, CApitol 8-6623, TWX HO 115; ODESSA, TEXAS, 402 West County Road, FEderal 7-2263, TWX ODESSA TEX 8041; EDMONTON, ALBERTA, CANADA, 7119-104th St., Phone 391-283. WEST COAST REPRESENTATIVE: Fred P. Kaenig Company, Long Beach, Calif., 3815 Atlantic Avenue, GArfield 4-3834. CANADIAN REPRESENTATIVE: T. R. Pickford & Company, Ltd., Calgary, Alberta, 309 7th Avenue West, AMherst 2-7371. EXPORT REPRESENTATIVE: New York 36, N. Y., 500 Fifth Avenue, BRyant 9-2236.

ORBIT VALVES

for the ORBIT VALVE





TO THE PETROCHEMICAL & CHEMICAL INDUSTRIES

WE HAVE RECOGNIZED THE DEMANDS OF THE CHEMICAL INDUSTRY FOR AN ULTIMATE LOW MAINTENANCE, POSITIVE SHUT-OFF VALVE THAT MUST MEET THE FOLLOWING REQUIREMENTS:

1. *NON-LUBRICATED TO PROTECT PRODUCTS FROM CONTAMINATION*
2. *VAPOR TIGHT CONSTRUCTION — NO CAVITIES TO TRAP FLUIDS*
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4. *LOW OPENING AND CLOSING TORQUES*
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6. *AVAILABILITY*

ORBIT FORGED STEEL VALVES MEET THESE REQUIREMENTS AS YOU WILL SEE IN SUCCEEDING ADVERTISEMENTS.

SIZES: 1", 1½", 2", 2½", 3", 4" and 6" Full Round Opening, Screwed or Flanged Ends, ASA 300 lbs. through ASA 2500 lbs. Venturi Pattern: 2", 2½", 3", 4" and 6" Flanged End Only, ASA 150 lbs. through ASA 2500 lbs.

SOURCE: Available through your favorite industrial supply house.

LITERATURE: Write Dept. B for Catalog 58-B and Service Manual No. 58.

ORBIT VALVES

WATCH FOR THESE ADVERTISEMENTS IN FORTHCOMING ISSUES OF CHEMICAL PROCESSING. MORE DETAILS TO FOLLOW.

"passes" through the coil result in niobium of increasing purity as more and more impurities are removed by the vacuum.

It is hoped that niobium will find important use in rockets, missiles, jet engines, and nuclear reactors. Unlike most metals, the material does not lose its room-temperature strength drastically with increasing temperature. At 2000°F it has about the same strength as molybdenum and is several times stronger than the best nickel-base and cobalt-base alloys. It is only slightly heavier than iron, and is not brittle at room temperature as are other high-temperature metals.

(Information courtesy of Westinghouse Electric Corp., Pittsburgh, Pa.)

Nuclear heat used to gasify coal

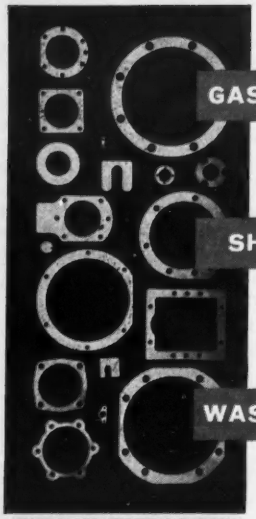
Experimental work conducted by US Bureau of Mines indicates feasibility of using process heat from nuclear reactors for gasifying coal. Studies with finely powdered low-rank coals (sub-bituminous coals and lignite) placed in alloy-steel tubes and exposed to temperatures about 1800°F have proven successful.

Gasifier for such low-rank coals would consist essentially of a heat exchanger transferring the heat from a stream of recycled helium to a steam-coal mixture. Heat exchangers operating at 2000°F would be needed for gasifying higher rank coals.

(Based on paper "Indirect Cycle Nuclear System to Furnish Process Heat" presented at 1957 Annual Meeting of the American Institute of Chemical Engineers, by R. Carson Dalzell, US Atomic Energy Commission, and James P. McGee, US Bureau of Mines.)

For more information on product at left, specify 4030 . . . see information request blank opposite last page.

No Order TOO SMALL... or TOO BIG!



With more than 50 years' accumulation of dies, chances are we can furnish the gaskets, shims, or washers you need *. . . without a die charge.* This can cut your cost and speed delivery—whether you need just a few items or large quantities. Gaskets, shims, washers or special stampings are available in metallic, non-metallic and plastics to meet your production requirements.

NOW...WIL-PAK PLASTIC SHIM STOCK with thickness identified by color and gauge number. Write for Bulletin No. 570.

Write for Catalog and prices

CHICAGO-WILCOX Mfg. Co.
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Check 4031 opposite last page

NEW POCKET CALCULATOR
For Liquid Batch Mixing

CAPACI-DIAL for PNEUMIX AGITATORS

Simply turn the pointer to the particular volume and consistency of your batch. The selector automatically tells the best size Pneumix Agitator to do your mixing.

The attached coupon will get you one without obligation.

ECLIPSE AIR BRUSH CO.
308 Park Ave. Newark 7, N.J.
Please send free CAPACI-DIAL to:
Name .....
Company .....
Address .....

Check 4032 opposite last page

IDEAS

Improves employee relations

Brochure of 32 pages tells how to establish a complete program of employee service recognition. Based on more than 50 years of background in such programs, brochure reflects combined experience of 100 top companies who have worked with manufacturer in development of their own service award plans. Employee Relations Brochure — Elgin National Watch Co., Elgin, Illinois.

Check 4033 opposite last page.

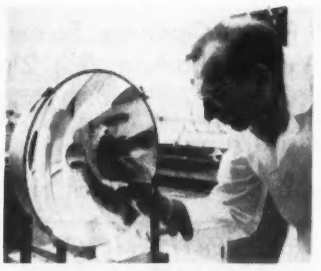
Produce 7000°F+ heat with elliptical mirrors from movie projector

Results comparable to those of 60"-diam solar furnace

Scientists have produced temperatures approaching that of the sun's surface with the use of two elliptical mirrors of the standard type found in motion picture projection equipment. The highly polished curved mirrors concentrate rays from a carbon arc into a small but extremely high-energy beam that has produced temperatures above 7000°F.

The arc-image furnace makes practical the high temperatures required in modern day research, according to Dr. R. G. Breckenridge, director of laboratories, National Carbon Company.

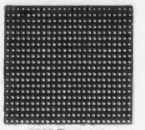
Expensive, specially designed parabolic mirrors have been used previously to focus the arc's energy on substance to be heated. In the new de-

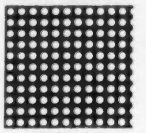


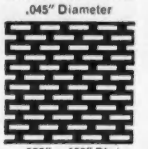
Temperatures produced by arc-image furnace approach that of sun's surface

H&K Perforated Screens

for Grading Sieving Dewatering Filtering Straining • Sterilizing and Tote Baskets


.020" Diameter


.045" Diameter


.028" x .125" Slot

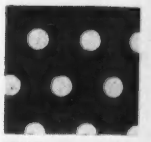
FIND NEAREST H&K AGENT IN THE 'Yellow Pages'

Listed Under "Perforated Metals"

H&K perforated screens are furnished, to customer order, with holes accurate and uniform in size, shape and spacing. The screen resists blinding as burr-free holes are slightly larger at the bottom. H&K perforated screens can be furnished with margins or unperforated areas in practically any material desired.

H&K specializes in the perforating of stainless steel, monel and other corrosion-resistant alloys.

Contact either H&K office or an H&K agent. Let us work with you on your perforated screen requirements.


Tapered Round Holes in Steel

No. 3 Diagonal Slot

Write for H&K General Catalog

THE Harrington & King PERFORATING CO. INC.

Chicago Office and Warehouse 5636 Fillmore St., Chicago 44
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Check 4034 opposite last page

- Hot Water Systems
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You can accurately read any low surface temperature with the Alnor Type 2300 Surface Pyrometer—in 3 to 5 seconds.

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PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Alnor

Check 4035 opposite last page

sign, one mirror directs the energy of the arc at the other, which in turn concentrates the radiation on the specimen being heated, forming a life-size image of the actual arc.

Results are reported to be comparable to that of a solar furnace with 60″-diam reflector.

Arc carbons less than ½″ diam, focused by 18″-diam mirrors, and placed about 6′ apart, are used on the furnace. Arc draws current of 200 amp. Normal operating voltage is 80.

(Arc-image furnace was developed by National Carbon Co., Division of Union Carbide Corporation, 100 East 42nd St., New York 17, N. Y.)

Check 4036 opposite last page.

School for engineers started in Chicago, Ill., by Western Electric

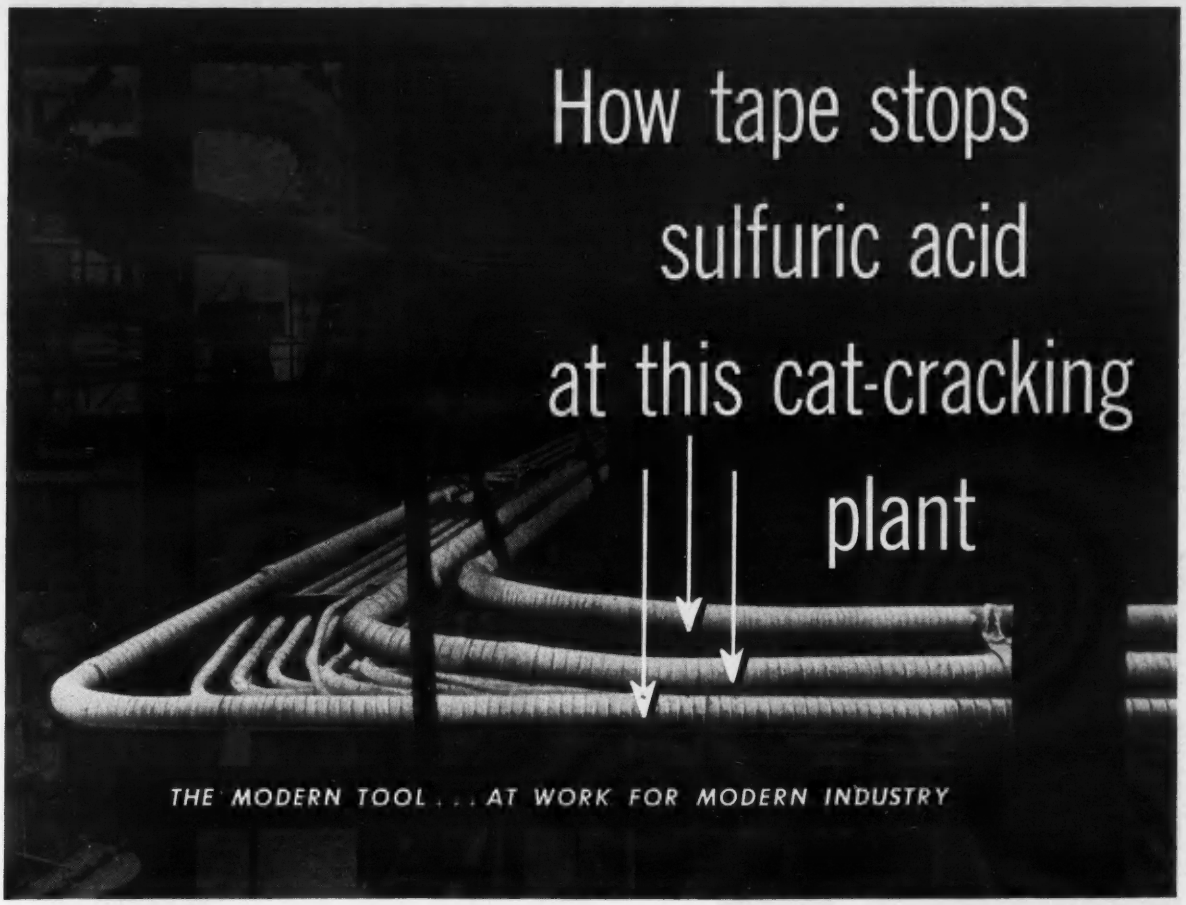
Students will come from firm's midwest plants

Engineering training center has been opened by Western Electric Company in Chicago, Illinois. Designed along same lines as company's other installations in New York City and Winston-Salem, N. C., the center will draw its graduate-engineer students from the firm's plants in the midwest region.

About 800 engineers will attend courses during 1958. Sessions are designed for new engineers to familiarize them with the intricate technical environment peculiar to the industry for which they work; and also for experienced engineers who must constantly study and review new developments in the field.

The center has about 30,000 sq ft of floor space. Twelve modern classrooms, library, laboratory, and a fully equipped cafeteria are included. A full-time staff of 20 is engaged in administrative and teaching aspects of the training program.

In addition, visiting lecturers from near-by colleges and



FIVE YEARS UNDER THESE HIGHLY CORROSIVE CONDITIONS PROVES THAT POLYKEN PROTECTION WORKS . . . *TO TRIM COSTS*

Look in on one of the world's largest fluid catalytic cracking units. A maze of conduit and pipe exposed to an extremely corrosive sulfuric acid atmosphere.

Formerly, these structures had to be painted every three or four months. Maintenance costs were excessive. Then, five years ago, they were wrapped with Polyken Protective Tape Coating. They have needed practically no attention since.

INERT POLYETHYLENE

The reason is that Polyken takes amazingly inert polyethylene and makes it into a tape coating with all these properties.

- **tough and elastic**
- **unplasticized, non-drying film**
- **doubly thick adhesive to seal all voids**
- **far higher adhesion for a true bond to pipe surface**
- **lower water vapor transmission rate**
- **higher electrical insulation resistance**
- **better cold weather handling and durability**

Check the savings. Contact the Polyken distributor in your area.

Atlanta, Georgia: Steele & Associates, Inc.
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Fort Worth, Texas: Plastic Engineering & Sales Corp.
Harvey, La.: Allen Cathodic Protection Co.
Houston, Texas: Cathodic Protection Service.
Kansas City, Mo.: Industrial Coating's Engineering Co.
Long Beach, Calif.: Barnes & Delaney
Minneapolis, Minn.: Simcoe Equipment Co.
Oakland, Calif.: Bison Co.
Philadelphia, Pa.: Harold N. Davis Co.
Pittsburgh, Pa.: Royston Laboratories, Inc.
Plainfield, New Jersey: Stuart Steel Protection Corp.
St. Louis, Mo.: Shutt Process Equipment Corp.
San Francisco, Calif.: Aetna Sales Co.
Seattle, Wash.: Farwest Corrosion Control Corp.
Seattle, Wash.: Pacific Water Works Supply Co.
Tulsa, Okla.: William Cluff Corp.

Polyken®
Experienced in modern PROTECTIVE COATING
THE KENDALL COMPANY
Polyken Sales Division

Check 4037 opposite last page

universities will assist in the program. Courses will be conducted on a full-time basis and will take four or nine weeks, depending on which category the engineer is in.

(Further information about engineering training program may be obtained from Engineering Division, Western Electric Company, Inc., 195 Broadway, New York, N. Y.)

Mobile oxygen plant makes LOX on spot for guided missiles

Four semi-trailers produce about 80 barrels per day

Mobile liquid oxygen plants which make possible the fueling of guided missiles from conventional materials available almost anywhere have been developed. Largest of the new plants, consisting of four semi-trailers, produces 20 tons, or about 80 barrels of liquid oxygen per day.

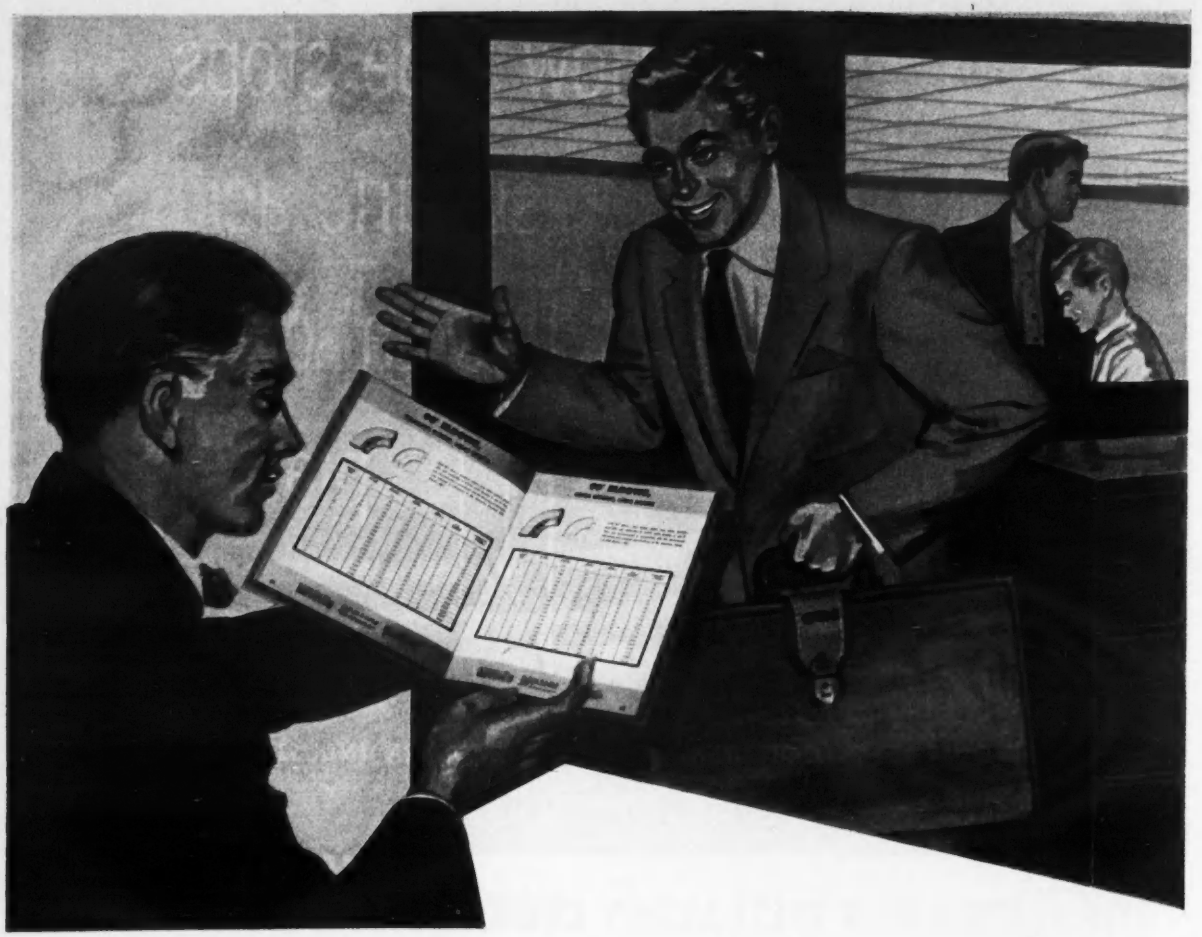
Only fuel requirement is about one-half pound of diesel fuel for each pound of LOX (liquid oxygen)produced.

Previously, tonnage quantities of liquid oxygen could be made only in large stationary facilities with relatively long "lead times" for erection, start-up, and supply of utilities. The mobile oxygen plants, of the 20-ton-per-day variety, require only a few hours installation time, and no cooling water or chemicals.

Mobile liquid oxygen plant

Plant is similar to "on site" tonnage oxygen plants used throughout the chemical, petrochemical, and steel industries.

(Mobile liquid oxygen plant was developed for US Army Corps of Engineers by Air Products, Inc., Allentown, Pa.)



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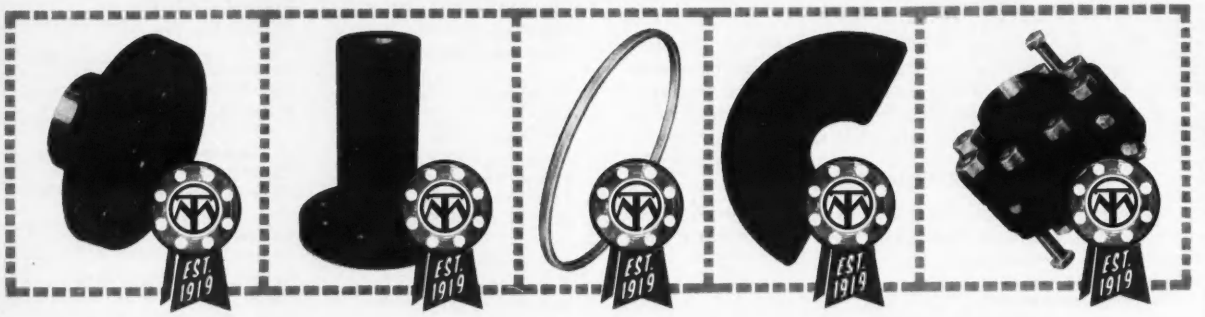

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Check 4038 opposite last page

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You know it will be sent to you free of charge.

If you would like to receive it and if you qualify, the publisher will add your name to the more than 50,000 key men in the chemical processing industries who receive each issue regularly.

Thus, the magazine will come to you personally, without charge, every month, to your designated address.

The necessary qualifications are outlined on the request form that can be found opposite the inside back cover.

Fill it out, being sure to give all necessary information, and mail to Reader Service Department.

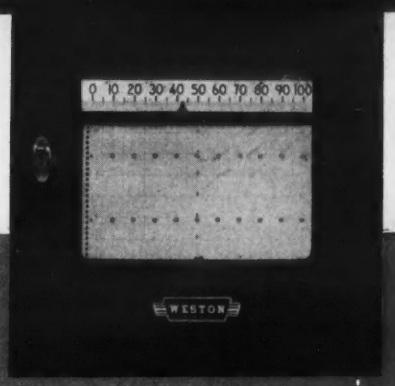
If . . .

others in your company would like also to receive CHEMICAL PROCESSING personally each month, they may be added to the form opposite the back cover.

Your application is welcomed.

For more information on product at right, specify 4039 see information request blank opposite last page.

DAYSTROM-WESTON MULTI-POINT POTENTIOMETER RECORDER



Simplest . . . most efficient . . . easiest to maintain . . .

through **UNITIZATION***

***UNITIZATION:**

the grouping of related components — in Daystrom-Weston Potentiometer Recorders — in the simplest, most serviceable, most efficient manner.

This versatile instrument collects information from as many as 24 sources, sorts it, and prints it with high accuracy in the form of up to 24 independent, simultaneous records. These functions are complex. But the instrument which performs them is neither complicated, cluttered nor delicate . . . thanks to Daystrom-Weston's UNITIZED DESIGN.

Parts are kept to a minimum, and integrated into compact, easily accessible panels. Spare-parts inventories are greatly reduced—due to interchangeability of components. There is no jungle of wires to hamper inspection and maintenance.

Routine servicing takes only seconds. Adjustments and circuit changes are made easily and without interrupting operation. All parts are designed for strength and shock resistance . . . to maintain alignment throughout years of hard usage.

The unique etched circuit switch is geared to the printing head . . . can't get out of synchronization. Up to 6 general or selective alarm contacts can be added in the factory or field.

You see above, the unitized measuring-selecting panel of the multi-point instrument. In most other respects, this recorder is identical in construction, and offers the same advanced performance and maintenance features as the DAYSTROM-WESTON SINGLE-POINT POTENTIOMETER RECORDER and RECORDER-CONTROLLER.

For full information on any of these instruments, call your local WESTON Representative, or write to WESTON Instruments, Division of Daystrom, Inc., Newark 12, N. J. In Canada: Daystrom Ltd., 840 Caledonia Rd., Toronto 10, Ont. Export: Daystrom Int'l., 100 Empire St., Newark 12, N. J.

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UNLOAD...

hopper bottom cars

- **quickly**
- **easily**
- **safely**

and at low cost

Write for BULLETIN D showing how you can save up to 80% unloading sand, sulfur, ore, and other bulk chemical materials

NATIONAL CONVEYOR & SUPPLY COMPANY
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Leak Lock STOPS LEAKS *where other compounds fail!*

Here's a simple, economical solution to many troublesome leaking joint problems. Leak Lock holds LP, gasoline, oils, gases, petro-chemicals and refrigerants that eat through ordinary joint compounds. It's remarkably tough, highly adhesive, remains flexible indefinitely . . . the joint compound that stretches rather than breaks. Years of use have established its advantages in stopping wasteful or hazardous leaks in the petroleum, chemical, atomic energy, electronic, refrigeration and other fields.

Approval by Underwriters' Laboratories for Gas and Oil Equipment List: Also for Propane and Butane.

FREE SAMPLE—Leak Lock is available in handy tubes and in cans. Write on your letterhead for sample tube.

HIGHSIDE CHEMICALS INCORPORATED
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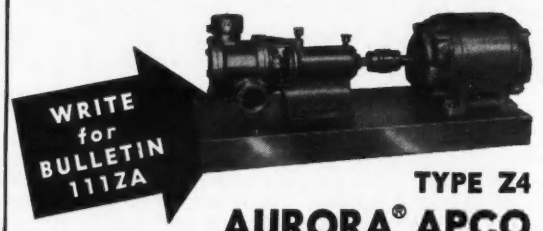
***The handling of liquefied petroleum gases, refrigerants and other light non-viscous liquids is a* CINCH!**



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AURORA® APCO *Process* PUMPS

New and difficult applications in modern industry pose a challenge to pump designers. Aurora engineers have met this challenge completely with the APCO TYPE Z4 Process Pumps—which combine the ideal turbine-type features, special metals where required, single mechanical seal and other latest design features for SURE RESULTS. We invite your inquiry.

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Check 4042 opposite last page

Auto engine smog factor may be greatly reduced by ceramic coating

Develop catalytic coating for piston heads

One of the greatest causes of smog and air pollution — automobile engine exhaust — may be eliminated by a modification of the ancient art of ceramics. Ceramic scientists have developed a catalytic ceramic coating for piston heads which shows promise of significantly reducing the amount of carbon monoxide and unburned hydrocarbons in exhaust gas.

Stemming from a previously developed method called "Flame Ceramics," the coatings are produced by spraying non-metallic powders through a flame gun. Results indicate that a flame-sprayable coating containing rare earth oxides acts as a catalyst in internal combustion engines.

With "about half" of the top area of its pistons coated, a standard automobile engine was run under idling, cruising, and full acceleration and deceleration conditions with non-leaded gasoline, and with air bled in at the carburetor intake. Comparing exhaust data from this investigation with an identical "uncoated" engine test, it was found that the coating decreased carbon monoxide and decreased unburned hydrocarbon proportion, particularly during acceleration and deceleration. Tests are being continued.

(Catalytic ceramic coating was developed at Armour Research Foundation, Illinois Institute of Technology, 35 West 33rd Street, Technology Center, Chicago 16, Ill.)

Adhesive facilities

Booklet of ten pages describes company's recently expanded elastomeric adhesive production facilities. Operation and services are described in detail. Form 74-69 — Dutch Brand Div., Johns-Manville, Corp., 7800 S. Woodlawn Ave., Chicago 19, Ill.

Check 4043 opposite last page.

YOUR OPINIONS —

— and comments on the significant subjects carried in each month's CHEMICAL PROCESSING are important! We *WELCOME* your letters expressing your views.

Many CP readers are taking the opportunity to state their views on today's top questions.

By publishing your letters in CHEMICAL PROCESSING others will have the opportunity of hearing your side.

Perhaps you agree

with what has been written in these articles.

Maybe you don't.

You might even have a thought or angle which wasn't expressed.

If so, why not let us and others hear your ideas? Suitable letters will be published in our regular "Letters from Readers" column. (See page 13 in this issue.)

Address your comments to:
The Editor
CHEMICAL PROCESSING
111 E. Delaware Place, Chicago 11, Illinois

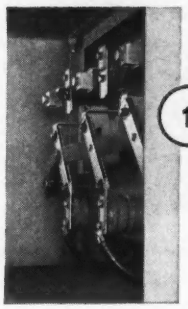
For more information on product at right, specify 4044 see information request blank opposite last page.

Newly designed
Type H Motor Control

Ultimate in protection
for men and machines

Here's the last word in control protection for personnel and equipment! It's all part of Allis-Chalmers newly designed, high voltage control.

And maximum protection is only one of the features of this new control line. You also get full-front access, smaller cabinet size (2.36 square feet less than competitive units), a completely tested unit, and ample panel space for optional features.



1. Gang-operated disconnect switch isolates starter from incoming power—assures safe entry to high voltage compartments.

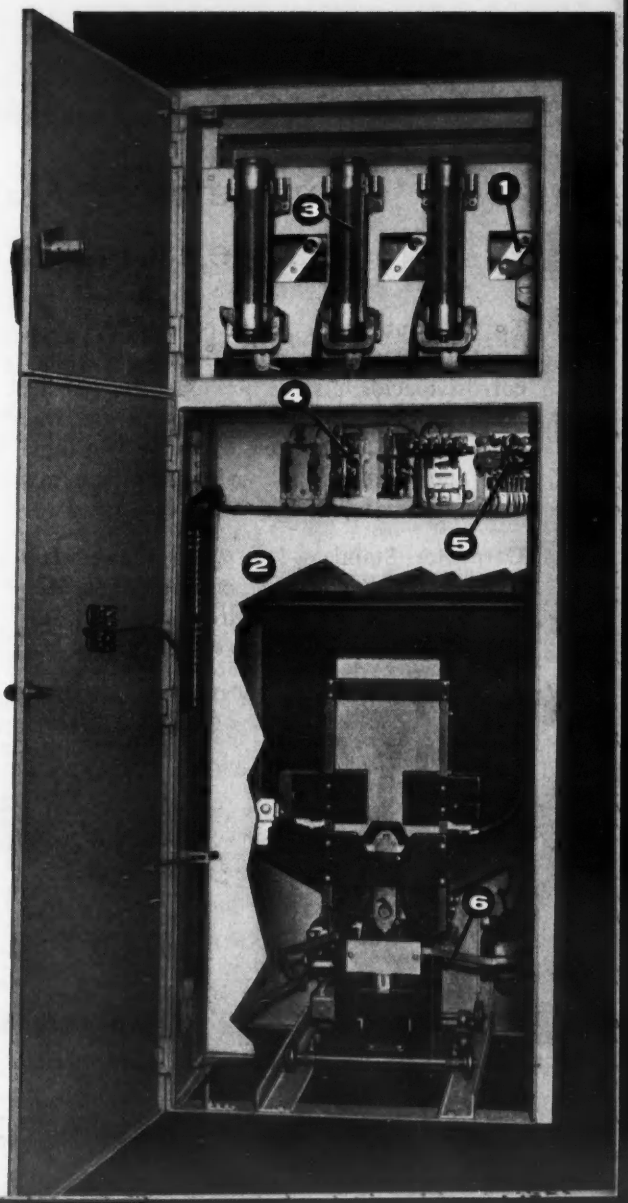
2. Steel cubicle separates high and low voltage equipment.

3. Short-circuit protection provided by fast-acting current-limiting fuses, rated 150,000 kva at 2300 volts and 250,000 kva at 4160 or 4600 volts.

4. Overload protection provided by accurate temperature-compensated thermal overload relays which trip only with excessive motor current, preventing needless motor stoppages.

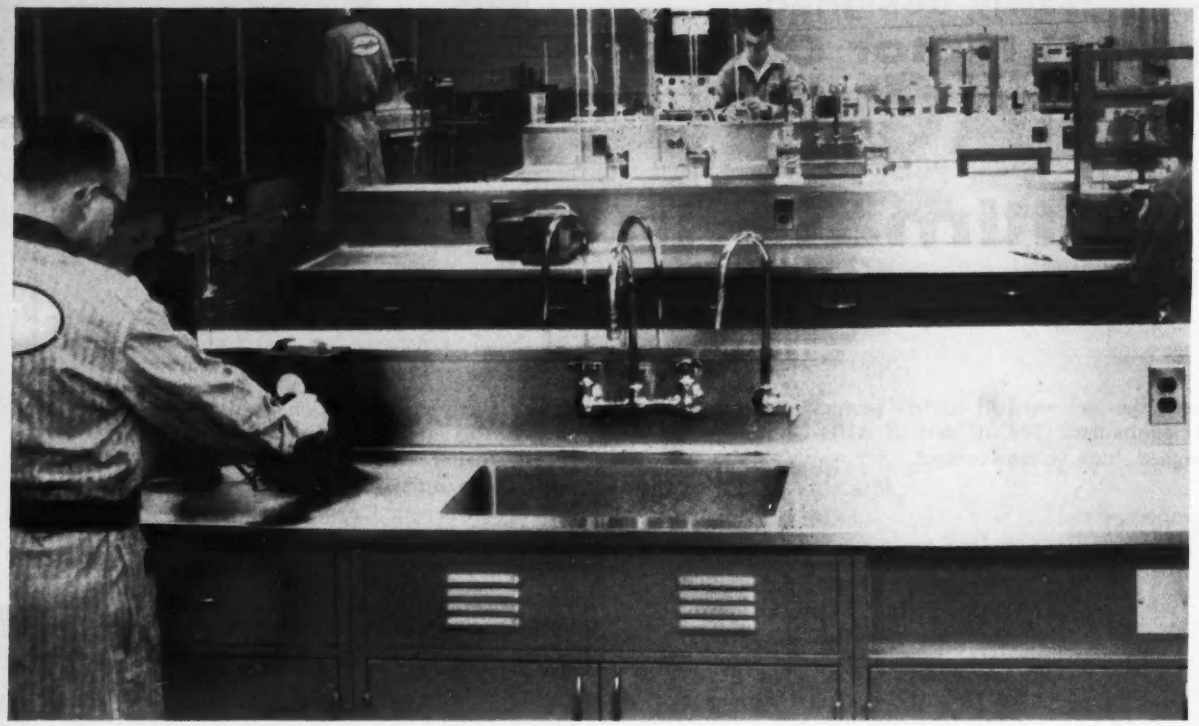
5. Undervoltage protection instantaneously opens line contactor on loss of voltage. Time-delay undervoltage protection also available.

6. Mechanical interlock coordinates contactor, disconnect switch, outer door and inner control barrier for maximum safety.



This starter line meets every 2300 to 5000-volt motor need. Contact your A-C office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wis.

ALLIS-CHALMERS



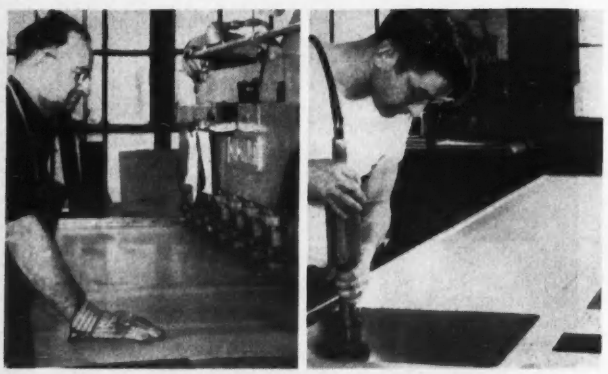
Competitive "Acid Test" Selects Carpenter Stainless No. 20Cb

To find out which grade of stainless steel would hold up best under attack by highly corrosive acids, a large manufacturer put his laboratory to work. The best performer was then selected as the steel to be used in table tops and sinks throughout his new materials testing laboratories shown above.

Carpenter Stainless No. 20Cb showed less weight loss than any other steel when subjected to mixtures of hydrochloric and sulphuric acids. Attack of the sulphuric acid was so slight that the spots easily wiped off. This super corrosion-resistant steel will withstand a wide range of laboratory acids in many concentrations and under varying temperatures.

Carpenter Stainless No. 20Cb advantages will pay off like this on any equipment. Money-eating corrosion can be stopped immediately and new economies will be built into your product performance. It's available as tubing, pipe, sheet, plate, strip, bar and wire through your nearest Carpenter distributor. The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

MEMBER



Shearing and buffing Stainless No. 20Cb sheet used for laboratory table tops and sinks.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Carpenter

Stainless No. 20 & No. 20Cb

Check 4045 opposite last page

Electricity produced direct from heat with new device

Units may eventually have over 30% efficiency

A new electronic device has been developed that converts heat energy directly into electrical energy. Experimental units have already changed more than 8% of the applied heat energy into electric power.

The thermionic converter operates on the principle that electrons can be boiled out of a hot metal surface and used to produce electric current directly.

Conventional thermocouples do this to a certain extent, but their efficiencies normally are below 1%. Big difference between the thermionic converter and a thermocouple is that the metals are separated by a gas at very low pressure in the converter.

There is an electrical flow between the electrodes, but there is less flow of heat than through metal. Thus the electrodes can be held at different temperatures, which boosts the efficiency. It is hoped that such converters may eventually be able to change over 30% of heat energy directly into electricity.

(Thermionic converter was developed by General Electric Company, Schenectady, N. Y.)

Describes EBWR

The experimental boiling water reactor (EBWR) constructed at Argonne National Laboratory is described in 233-page volume that contains 179 illustrations. This reference volume sums up engineering data and other information on the first reactor power plant to go into operation under the AEC's experimental power reactor program. To obtain "Experimental Boiling Water Reactor" remit $2.25 direct to Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Continuing last month's report on petrochemical research study, additional comments by leaders show that —

PETROCHEMICALS MEAN MASS PRODUCTION IN HIGHLY INSTRUMENTED PLANTS

World-wide nature of development, tremendous scope and bright future of petrochemical industry, and importance of plastics in field emphasized in remarks

DR. T. C. DAUPHINE', Mgr of Product Development, Plastics and Polymers, Hooker Electrochemical Co., and member of CHEMICAL PROCESSING Editorial Advisory Board — I feel the petrochemical industry will continue to make lower cost and more diversified intermediates available to the chemical industry as standard raw materials. However, most of the obvious large-scale intermediates have already been commercialized. The new materials will be somewhat specialized in use and available in smaller quantities than some of the very-broad-scale developments (ethylene, petroleum xylene, petroleum benzene and toluene, etc.). I think the current activities will expand with little obsolescence. New developments in packaging and transportation may make light hydrocarbons more available at considerable distances from refineries.

DR. A. L. ANTONIO, General Manager, Chemical Division, The General Tire and Rubber Company — Due to an impending change in fuel types, and to increased production of plastics and intermediates, there will be an increase in chemical uses of petroleum. Chemical growth in other areas will be exceeded by that from petrochemical bases.

RUSSELL HOPKINSON, Senior Vice President, Organic Chemicals Division, Olin Mathieson Chemical Corporation — In the next 15 years, up to four or five percent of the total output of the petroleum and natural gas industries will be required for petrochemicals. Half the production for the whole chemical industry will come from such raw materials. Major increases will be in the field of plastics and resins, rubbers, synthetic fibers.

DR. LEWIS E. LLOYD, Economist and Head of Business Research, The Dow Chemical Company — Petroleum will increasingly be the raw material for all organic chemicals. As plastics segment matures, demand for petrochemicals will be manifold. The chief characteristic of petrochemicals which equates them with the petroleum industry in some people's minds is the tendency for each to be done on a mass basis. This large-quantity production is possible because of large markets. Both petroleum plants and petrochemical plants apply automation through automatic controls — which, by the way, were developed by the chemical industry.

J. S. FLUOR, President, The Fluor Corporation, Ltd. — I believe that the future development of the petrochemical industry will be greater than either petroleum or chemical because it is relatively new and many more new products will be developed if the intensive research program continues.

I believe that petrochemical development will be about the same in the United States, England, and Germany. A little behind will be France, Belgium, and other small nations. USSR is anyone's guess.

Another petrochemical executive says — Petrochemical development should proceed at a rapid pace under the influence of large expenditures for research by both the chemical and petroleum industries. The petrochemical industry is well adapted to use automation to a high de-

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for Better
Values

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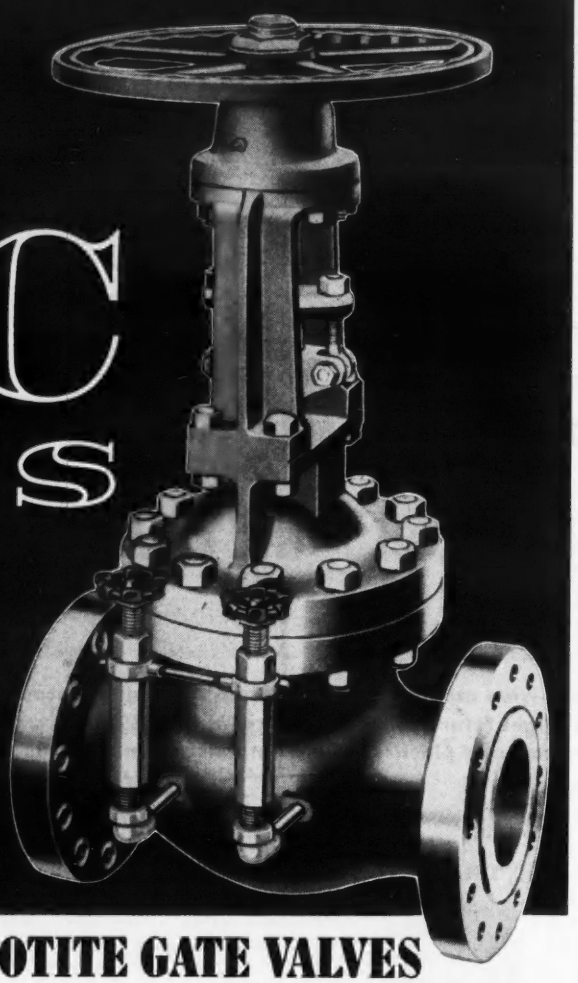
VALVES

THE COMPLETE LINE
—DESIGNED FOR DEPENDABILITY



R-P&C "Sure-Tight" LUBROTITE GATE VALVES

—THE MULTI-SERVICE VALVES LUBRICATED THROUGH THE SEAT RINGS

Lubrotite Gate Valves—created and patented by R-P&C—are built to provide absolute tightness and long, trouble-free service in handling all fluids for which iron and cast steel valves are serviceable.

By the unique Lubrotite system, in which each seat ring is served by a Lubrotite gun, a lubricant seal is forced through to the valve's seating surface. This lubricant prevents leakage, retards corrosion, prevents sticking, reduces wear on seating surfaces and makes for easier operation. Net result: reduced operating, maintenance and over-all valve costs!

Available in cast steel and iron types. A wide variety of lubricant seals, each suitable for numerous services, can be furnished.

Lubrotite Gate Valves are giving highly successful service in handling—

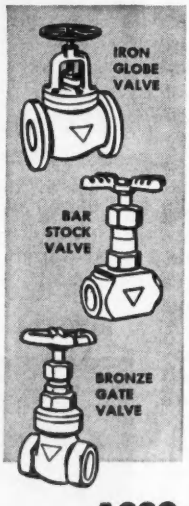
Gasoline...Oil...Benzol...HF Alkylation... other Petroleum Derivatives —

Natural and Artificial Gas...Air... Helium Gas...Coke and Gas...Water —

Vacuum Service (evaporation, etc.)... Feed Water Lines and Steam Plants —

Mine and Acid River Waters... Certain Chemicals...Other Services

Lubrotite Gate Valves form a part of the complete R-P&C line, which includes gate, globe, angle and check valves in all standard materials; all in a wide range of sizes, styles and pressure classes. Order through nearby R-P&C Distributor. Write our Reading office for catalog.



FREE WALL CHART
"How to Protect Your Valves"
Installation pointers, operating tips, clues to longer valve life. They are all on this 22" x 17" wall chart. Write for your free copy.

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AMERICAN CHAIN & CABLE

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ACCO

Check 4046 opposite last page

gree. Many startling developments in the field of chemical processing by radiation should occur. The vast needs of modern housing, transportation, agriculture, and clothing should multiply the demand for plastics, elastomers, fertilizers, and fibers produced from raw materials of petrochemical origin.

Petrochemical production in Western Europe to expand rapidly

Big markets in plastics, synthetic rubber, detergents

Petrochemicals production in Western Europe will exceed one million tons a year by about 1959, an oil scientist estimated recently. The current figure is 600,000 tons. Dr. Colin Haley, of Esso Research Limited, Abingdon, England, told the 30th International Congress of Industrial Chemistry, that in the next five years output of chemicals-from-oil should continue to rise to some 1½ million tons annually.

The plastics industry, he said, is probably the most rapidly expanding of all the important markets for petrochemicals, with polyethylene showing the most rapid increase in consumption.

Dr. Haley also mentioned the important roles which will be played by new synthetic rubber projects in France, Germany, Italy, and Britain. GR-S (general purpose) synthetic rubber plants are being built in Britain, Germany, and Italy, and a butyl facility is expected to start up in 1958 in France.

The Esso Research official pointed to synthetic detergents made from oil as another major factor in the petrochemicals expansion in Europe. In the US, two-thirds of all washing materials are being made this way and Dr. Haley said the trend is being followed "all over the world."

Dr. Haley described the recovery of the European chemical industry since the war as "spectacular." Chemical production there in 1956

was about 160 percent of the prewar level. Before the war, he recalled, by far the greater part of the European industry was based on coal. Now, an increasing share is being supplied by oil, and developments in the chemicals field have gone hand in hand with this trend, he said.

He added: "It seems unlikely that the plan for a European common market will markedly affect the rapid development of petrochemical industries except in so far as it may help to increase the rate of expansion if that is possible. However, it may be that one effect of the scheme will be to shift more and more the emphasis of production to bigger, more integrated, and hence more economic projects."

Quick way to make equilibrium flash calculations

A quick method for determining amounts and compositions of liquid and vapor mixtures in equilibrium in flash distillation calculations is now possible through use of a large size (12 x 5") slide rule developed by Dr. Manfred von Stein, senior process engineer at the M. W. Kellogg Company. Slide rule is based on a newly developed formulation which converges toward the final solution more rapidly than the conventional calculation routine. Given the number of mols of the mixture-components, temperature, total pressure and equilibrium constants, calculation may be started with any arbitrarily assumed value of percent vaporization.

With help of the slide rule, one can make succeeding trials until the solution is reached. Each trial is based on discrepancy found in preceding trial.

(Equilibrium-Flash slide rule is available from the M. W. Kellogg Co., a subsidiary of Pullman Inc., 711 Third Ave., New York 17, N. Y.)

Check 4047 opposite last page.

Esso's 80,000 lbs of Alcoa Aluminum jacketing (alloy 3003 sheet) gives all-weather, year-round protection to one 20-in. high pressure steam line . . . two 30-in. low pressure steam lines . . . one 16-in. low pressure line, two 8-in. steam-traced fuel oil lines.

Designed by Esso engineers and several consulting firms, the pipeline system joins Bayway Refinery facilities with the Linden generating station of the Public Service Electric and Gas Co. Jacketing was applied by the Trybee Co., Inc., Garfield, New Jersey.

Corrosion-resistant Alcoa Aluminum pipe jacket helps Esso save $500,000 annually

Light, bright, corrosion-resistant jacketing of ALCOA® Aluminum helps Esso Standard Oil Company save over $500,000 annually. Installed on 5½ miles of large diameter, steam-carrying pipe at the company's Bayway, New Jersey refinery, the aluminum jacketing shields the piping and its insulation from rain, snow, dirt and ice . . . while providing highly effective protection against an industrial-marine atmosphere.

Esso estimates that the insulation with its protective aluminum jacketing has cut pipeline heat loss to just 5% of that experienced with bare pipe. In a year's time, over $500,000.00 would be needed to replace heat lost without such protection. The aluminum jacketing keeps the insulation fully effective by guarding it against weather damage.

Like Esso, you will reap handsome dividends through effective insulation protection and reduced corrosion damage . . . by jacketing your insulated pipelines with light, bright, corrosion-resistant ALCOA Aluminum. For full information, use the coupon or write ALUMINUM COMPANY OF AMERICA, 902-C Alcoa Building, Pittsburgh 19, Pennsylvania.

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Please send me full information on corrosion-resistant Alcoa Aluminum Pipe Jacketing for the following piping services:

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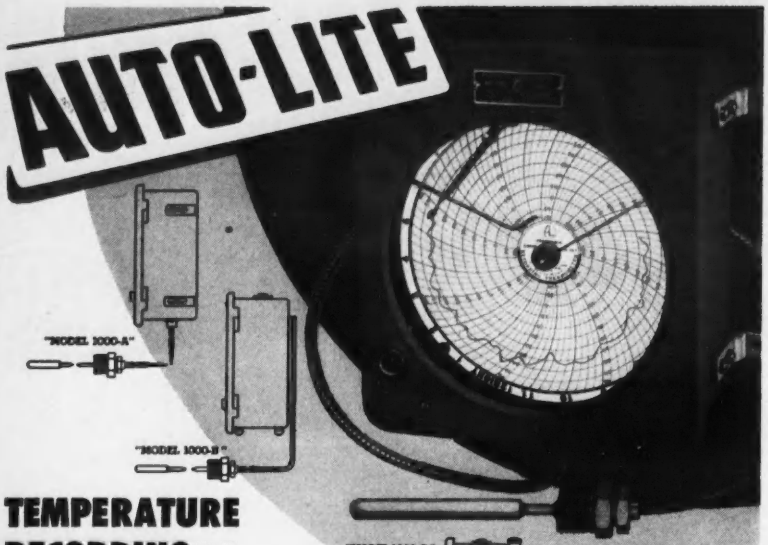

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TEMPERATURE RECORDERS AND INDICATORS

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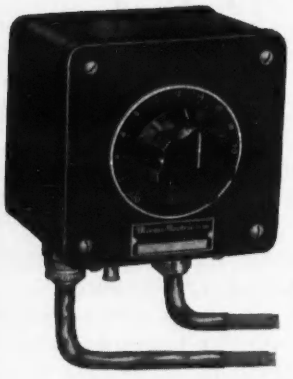
Rotary Selector Switches Are Fast, Convenient



For Thermocouples Or Resistance Bulbs

Expertly engineered and ruggedly constructed, T-E's Rotary Selector Switches combine speed and convenience with trouble-free performance. Use them for frequent checking of temperature measuring circuits, for switching circuits from one instrument to another, or for connecting one instrument to a number of measuring points. They'll operate with millivoltmeter or potentiometer-type pyrometers, and with resistance bulb thermometers. Contacts and wipers of the same silver alloy eliminate possible false voltages from thermoelectric action. Three models offer capacities of OFF to 6, 12 or 24 points.

Other Types

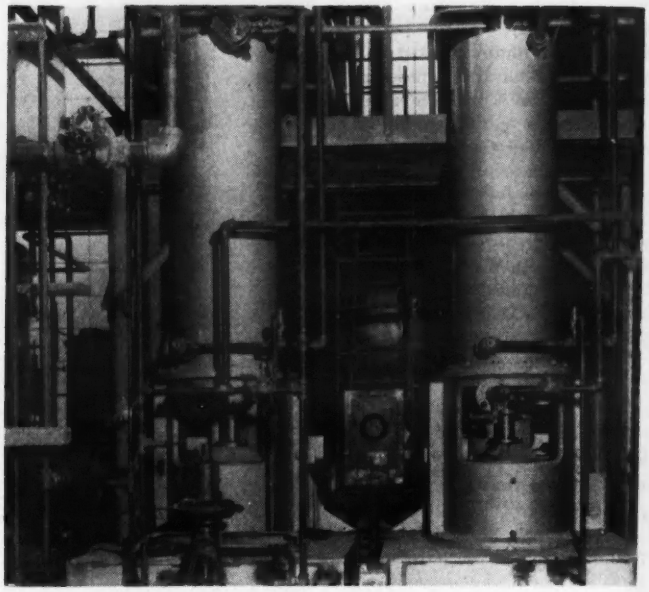
For equal dependability and convenience, investigate T-E's wide variety of key and push-button selector switches—and quick-coupling connectors and panels.

Write for Bulletin 24-WS-R.

Thermo Electric Co., Inc.
SADDLE BROOK, NEW JERSEY
In Canada—THERMO ELECTRIC (Canada) Ltd., Brampton, Ont.

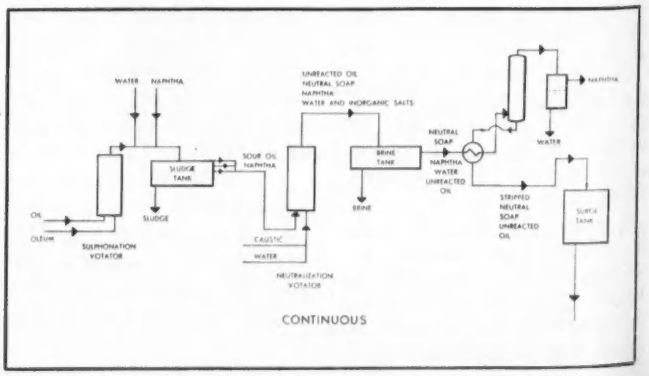
Check 4050 opposite last page

Canadian petrochemical plant produces petroleum sulfonates



Primary sulfonation takes place in multiport injection reactor at right. Sour oil is neutralized in a similar unit at left. These two units are the heart of the process

First Canadian petrochemical plant for the production of petroleum sulfonates was placed in operation recently by Surpass Petrochemicals Ltd., Scarborough, Ontario, Canada. Surpass is a subsidiary of Montgary Explorations Ltd. Plant will produce seven million pounds of oil-soluble sodium sulfonates per year. It is also equipped to make other sulfonates — such as those containing lithium, calcium, or barium. Petroleum sulfonates are used as additives to motor lubrication oil, corrosion inhibitors, chemical intermediates, herbicides, insecticides, and dry-cleaning



Uses multiport injection reactor, a specialized heat exchange unit, for primary sulfonation

solutions and preparations.

Primary sulfonation reaction takes place in a Votator multiport injection reactor which is designed in such a manner that one of the reactants (oleum in this instance) is split in a large number of small streams and injected at staged intervals along the reactor length. Injection is made at points of high turbulence thus increasing the efficiency of the unit. The scraped surface heat exchanger principle is also employed, thus giving a maximum heat transfer for a minimum amount of surface. Primary sulfonation, sludge separation, neutralization, and stripping are continuous while the remaining steps are batch operations.

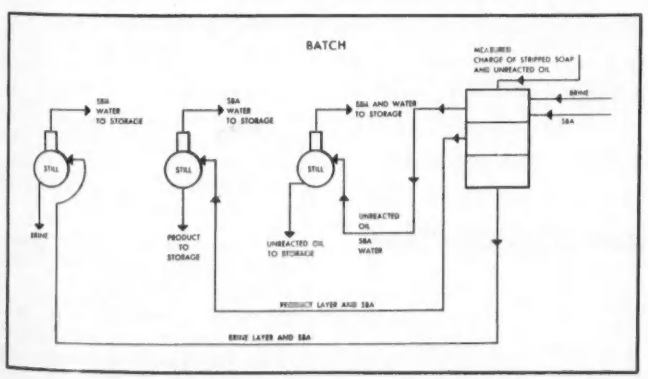
Various ingredients such as oil, caustic soda, oleum, naphtha, and water are pumped to five small 300-gallon tanks with a capacity for part of a shift. Each tank is equipped with float switches that automatically start charge pumps when a low level is reached. These tanks are interlocked so that if one should become empty, discharge from all will stop.

A set of proportioning pumps deliver oleum and a special cut of petroleum crude to the first reactor. Reactor is water-jacketed to keep the temperature of the primary sulfonation reaction constant and to remove heat given off by the reaction.

Water and naphtha are added to the "sour oil" or crude sulfonate as it passes from the reactor into the sludge separation tank. The sludge is drawn off to waste and the sour oil is drawn off at the correct level to be pumped to the second reactor where, with caustic soda, the neutralization takes place.

Brine is separated from neutral oil in the next tank. Brine is discarded and the oil enters the top of a steam naphtha stripper. As the steam rises, it carries the naphtha with it. Water and naphtha are separated in a decanter. Naphtha goes to storage. Neutral oil passes out the bottom of the stripper into a surge tank. This is the end of the continuous part of the process. The last steps are carried out in batches.

To the neutral oil in the classification tank at the start of the batch operation is added secondary butyl alcohol and salt solution. After thorough mixing, the solution is allowed to settle. Three distinct liquid phases result. Bottom or brine layer, containing inorganic salts and low molecular weight organic impurities, is transferred to a



ONE MAN, and a "Varec" PULSE CODE System, can gauge and record 100 tanks in 12.3 minutes– AUTOMATICALLY

Quite a job for one man—and quite a saving for his employer. A saving in labor, time and overflow losses, and an increase in production efficiency. The secret, of course, is the "Varec" PULSE CODE equipment wisely specified by the farm operator. He has discovered what thousands of successfully operating "Varec" installations have been proving for years: that automation *means* reduced operating costs, and automation by "Varec" *guarantees* it.

"Varec" has been the leader in the field of automatic tank gauging since its inception. This progressive leadership, coupled with over 30 years experience in faithfully supplying the nation's petro-chemical industry with products noted for their dependability and excellence of design and manufacture, has resulted in the "Varec" PULSE CODE Telemetering System—the finest in the field.

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Investigate the opportunities of a "Varec" installation for your tank batteries. Competitively priced in initial cost, unmatched in record of performance, when you specify "Varec," you are buying the best.

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Check 4051 opposite last page

still for alcohol recovery. Concentrated sodium sulfonate is recovered as the main product from the second layer by removing alcohol and water in a second still. This goes either directly into drums or to storage in the tank farm. The top layer from the classification tank goes to a third still where unreacted oil is separated from secondary butyl alcohol (SBA) and water.

All the vessels are mild steel except the reactors, which are stainless steel. Most of the vessels operate at atmospheric pressure. Safety devices such as flame arresters, blow-off valves and interlocks between steps are used. In addition, a three-compartment trap prevents flammable materials from entering the sewer. Storage tank for secondary butyl alcohol is located underground because of its flammable nature. SBA leaves the stills at over 200-300°F and is cooled before passing into the storage tank.

Plant uses a total of 141,000 gallons of water per 24 hours but with the use of a cooling tower, only 2500-3000 gallons per day of make-up water is required.

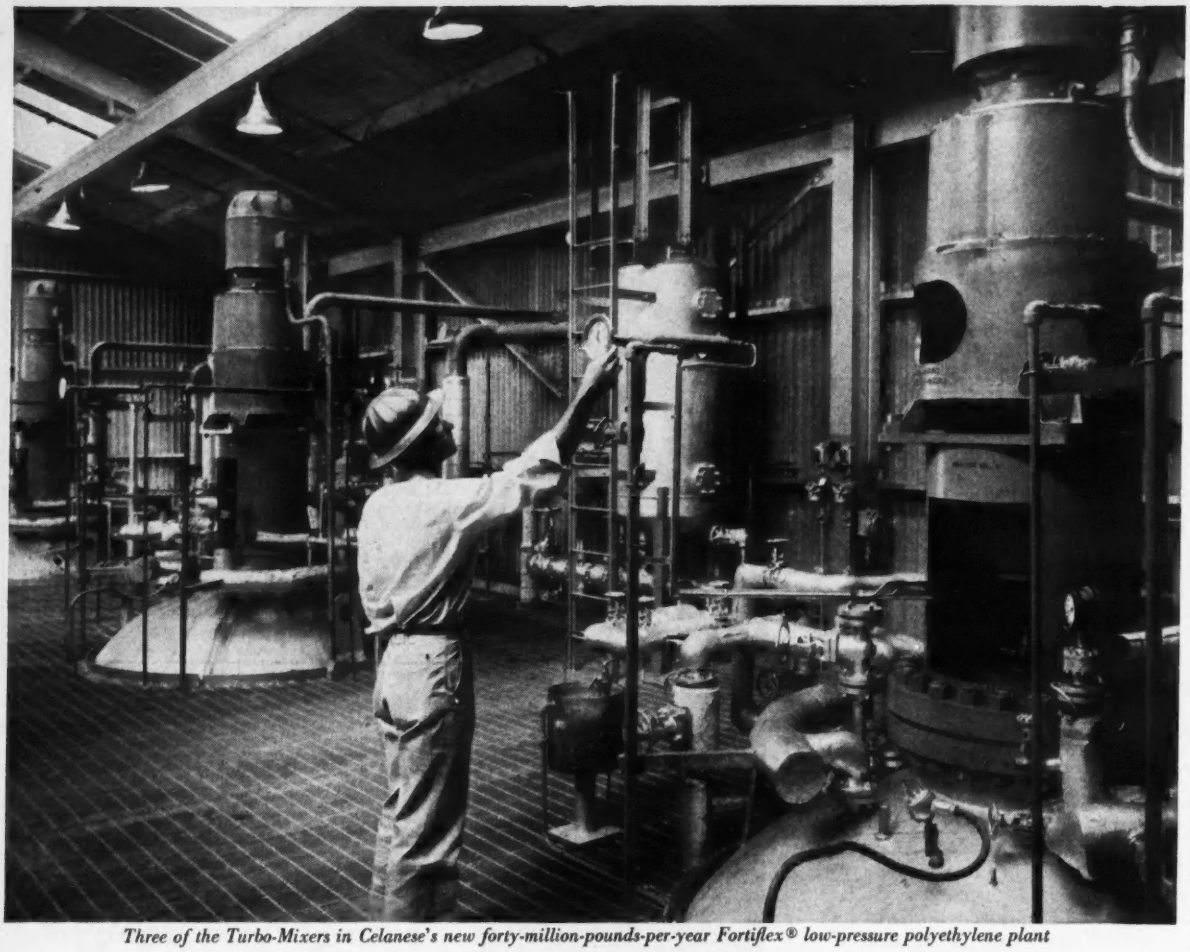
(Multiport injection reactor is product of Votator Div., The Girdler Co., A Div. of National Cylinder Gas Co., 224 E. Broadway, Louisville 1, Ky.)

Check 4053 opposite last page.

Butadiene manual

Recently published 52-page manual on butadiene is said to be most comprehensive booklet ever published on the versatile petrochemical. Although more than a billion lb per year of butadiene are manufactured, up until recently most of this has gone into synthetic rubber. This manual is designed to encourage increased use of butadiene for other applications.

Manual contains four main sections, the first of which presents an extensive list of physical properties in both tables and charts. Second section discusses characteristics



Three of the Turbo-Mixers in Celanese's new forty-million-pounds-per-year Fortiflex® low-pressure polyethylene plant

for critical low-pressure polyethylene reactors,

CELANESE CHOOSES TURBO-MIXERS

The *formative reaction* is a critical step in the manufacture of Fortiflex®—now being made in the brand-new forty-million-pounds-per-year low-pressure polyethylene plant of the Plastics Division of the Celanese Corporation of America.

For this reaction, Celanese engineers had to have a mixer that would exactly maintain the correct mixing environment. For this reliability in design and performance, Celanese selected Turbo-Mixers. The above-pictured reactors are in the full scale plant (not the pilot plant). Turbo-Mixers serve in many operations in this and other polyethylene plants.

Turbo's 45 years of experience in design . . . Turbo's record of dependability . . . and Turbo's single-source responsibility make the difference. If you're in the process of selecting or specifying mixing equipment, call on Turbo. You'll find . . . *it pays to plan with General American.*

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Check 4052 opposite last page

of butadiene in three major areas — dimerization, peroxide formation, and relative reactivity of the petrochemical with various other monomers.

A 26-page section demonstrates versatility of butadiene as a basic raw material, including more than 150 reactions covering Diels-Alder condensations, addition, oxidation, substitution, and Oxo reactions.

Final section shows more than 70 possible end uses. More than 300 reactants and reaction products are covered.

(Manual is available without charge (to universities and research personnel in companies engaged in development work on new products and processes) from Texas-US Chemical Co., 260 Madison Ave., New York 16, N. Y.)

Check 4054 opposite last page.

Diisobutylene available

Petrochemical furnished in commercial quantities

Uses: Applications include depolymerization to yield isobutylene, alkylation with phenol toward production of surface-active agents, and manufacture of nonyl alcohol by the oxo process.

Features: High-purity material is available in substantial quantities.

Description: Commercial product is a clear, water-white four-to-one mixture of 2,4,4-trimethyl pentene-1 and 2,4,4-trimethyl pentene-2. Physical properties follow:

MW, ave, calc	112.1
Sp gr, 60°F	0.720-0.722
Engler dist range, 760 mm Hg	
Initial	210°F
90% point	218°F
95% point	219°F
Bromine No.	140
Sulfur, less than	60 ppm
Reid VP, psi	1.4

(Diisobutylene is product of Petro-Tex Chemical Corp., PO Box 2584, Houston 1, Texas.)

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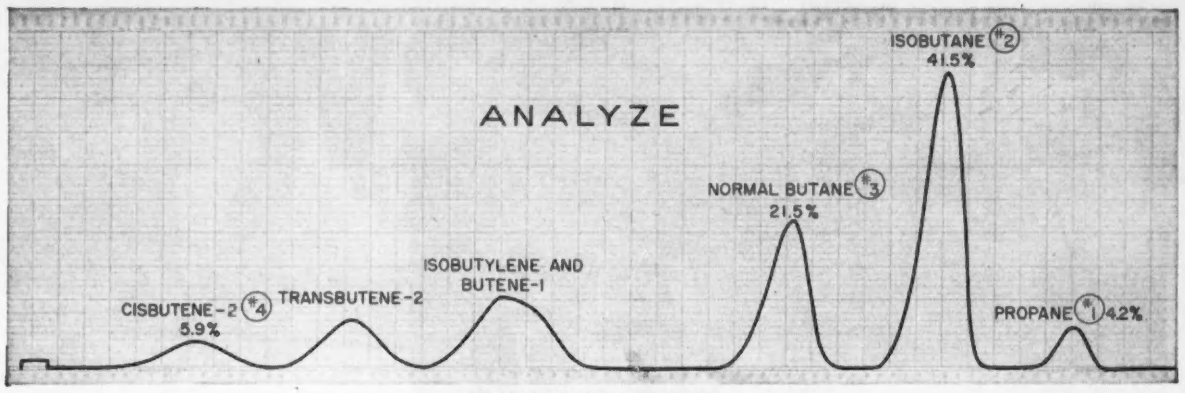


Top: Model 184 fractogram in one mode of chart presentation shows quantitative analysis of components from typical refinery stream.

Bottom: Percent concentration of four preselected components from fractogram above is directly shown on bar chart.

Left: Timing dial of programmer is designed for fast set-up and calibration, also to indicate peaks.

A New Instrument for

AUTOMATIC PLANT STREAM ANALYSIS BY GAS CHROMATOGRAPHY

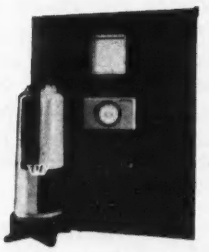
After more than a year of field tests with ten leading oil and chemical companies, a new process vapor fractometer is now commercially available for multi-component analysis and monitoring of process streams.

The Model 184 is simple, versatile and reliable. Long term accuracy under plant conditions was a prime design consideration. Reproducibility is unequaled. Every safety feature has been incorporated.

Thanks to its in-plant evaluation by top instrumentation and process control engineers, the new P-E Model 184 can be put on stream with confidence—next year's afterthoughts are already built in.

For more information write us at 810 Main Avenue, Norwalk, Conn.

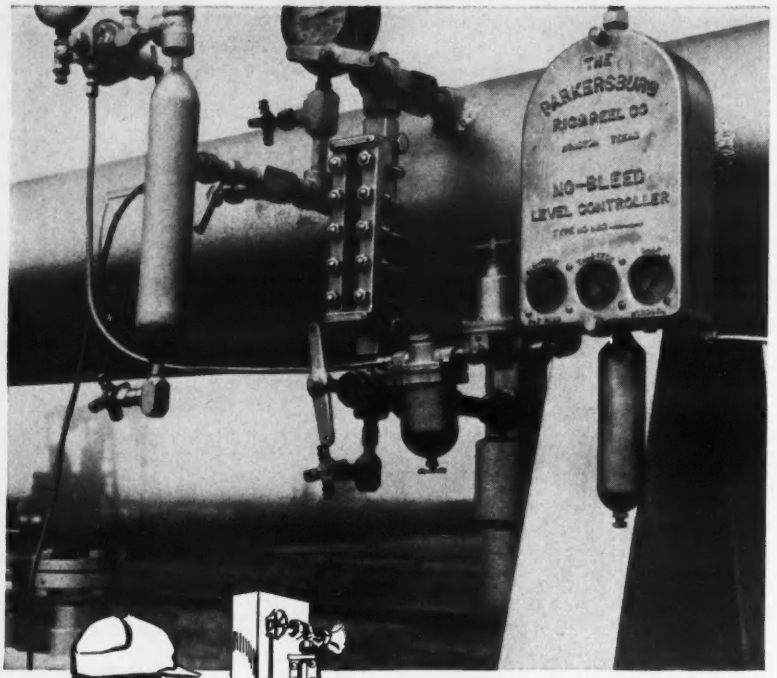
Plan to visit our Booths at the Pittsburgh Symposium, March 3-7, Penn-Sheraton Hotel. We have a number of new developments to show you.

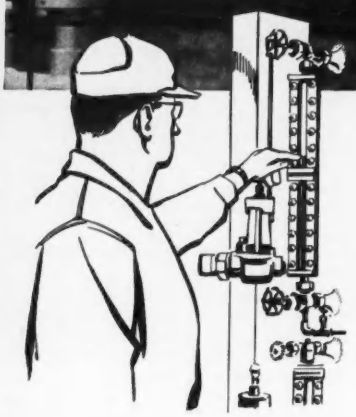


Model 184 consists of analyzer unit in explosion-proof housing, panel mounted programming and recording units. Instrument monitors up to four components directly on bar chart.

INSTRUMENT DIVISION
Perkin-Elmer *Corporation*
NORWALK, CONNECTICUT

Check 4056 opposite last page





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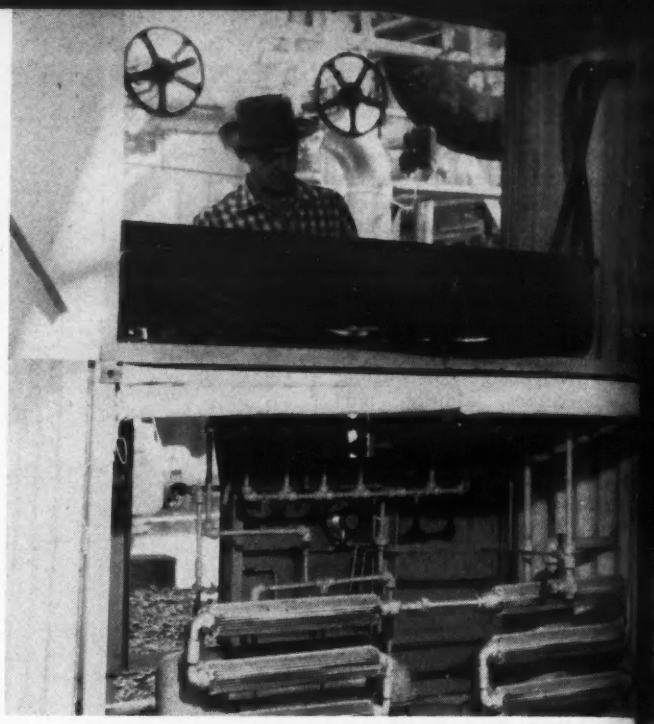


Mississippi Chemical Corporation rapidly diagnoses operating problems in gas purification process for petrochemicals

Infrared analyzer 'spots' troubles in gas streams

By **J. R. PHILLIPS**
Assistant
General Operations Manager
Mississippi Chemical Corporation
Yazoo City, Mississippi

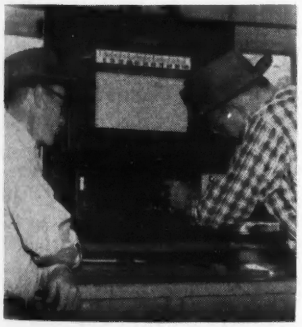
Problem: While presence of certain impurities such as methane is not poisonous to catalyst in synthesis of ammonia at Mississippi Chemical Corporation's Yazoo City, Mississippi, plant, quantities of the gas will act as a diluent, reducing efficiency. Also, presence of certain other gases, carbon monoxide and carbon dioxide, in the hydrogen-nitrogen make-up streams is very undesirable. Good operational practices require that gas purification operation in the ammonia synthesis be constantly under scrutiny.

Solution: Installing an infrared gas analyzer in the Fall of 1955, Mississippi Chemical has been able to make rapid diagnoses of gas streams for impurities. As operated at the Yazoo City plant, a sampling manifold arrangement located in gas purification unit permits instrument to monitor carbon monoxide, carbon dioxide, and methane content of hydrogen-nitrogen streams.

Normal practice is to continuously record methane concentration in two of six streams, alternating from one stream to the other every four hours. When desired, other impurities can be determined by same instrumentation with certain minor internal modifications.

Infrared analyzer is of nondispersive design, operating by means of absorption comparison. Two similar Ni-

Constantly and continuously analyzing gas stream in petrochemical plant, infrared analyzer can be readily adapted to monitor impurities as desired. Six lines of tubing (upper right) convey samples from six steams of ammonia synthesis gas in various stages of purification



Permanent record of monitoring impurities in process stream in petrochemical plant appears on continuous chart-recorder. Operator adjusts power and potentiometer controls on panel below recorder

chrome filaments are separate radiation sources for "test" and "reference" beams. Motorized reciprocating shutter, or "beam-chopper," alternately interrupts these. Action occurs in such a way that superimposing the two "blinking" beams would result in a single steady beam.

Sample stream flows through a stainless steel cell in op-

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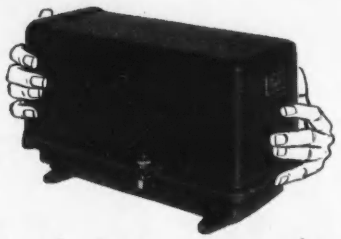

NOW we can offer you immediate delivery of the 700T Taylor TRANSET* Potentiometer Transmitter—custom-equipped for your specific application. **It's the unique** plug-in features of this instrument—plug-in amplifier, plug-in transducer, plug-in service "cans"—that make it so superior and so readily adaptable to your needs. *And it's these same benefits of flexibility that permit us to fill your orders so promptly.*

Plug-in service "cans" means that the instrument can be quickly adapted for use with different primary elements by simply plugging in the corresponding can. (For thermocouple applications cold junction compensation is provided in the can).

Just one amplifier. You change its service by switching service cans. Both the amplifier and the transducer plug-in . . . means minimum instrument down-time for service. Also means low instrument inventory because you only need one spare amplifier.

Check these additional benefits: • Infinitely sensitive to input signal. • High order of linearity and accuracy. • No moving parts such as slidewires, batteries, or standard cell. • Continuous vernier range adjustment. • Continuous vernier zero or suppression adjustment. • Convenient front panel checkout and adjustment. • Printed circuit, for completely uniform performance. • Thermocouple burnout protection, either up or down scale.

Acknowledged by users as the finest instrument of its kind on the market, the TRANSET Potentiometer is ideal for processes permitting the use of pneumatic receivers and controllers, whether large case or miniature. Its outstanding flexibility permits a narrow or wide range span according to process demands.

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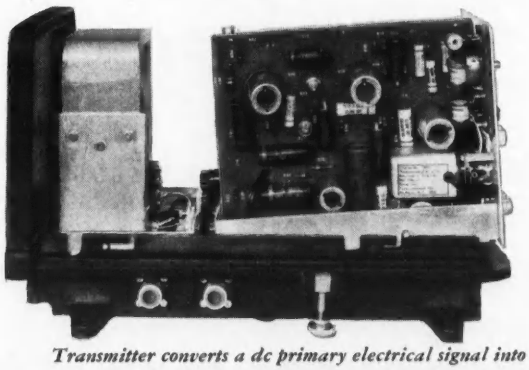
Call your Taylor Field Engineer, or write for **Catalog 98262.** Taylor Instrument Companies, Rochester, N.Y., or Toronto, Ontario.

*Reg. U.S. Pat. Off.



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VOLTAGE . . . *For pH; strain gages; tachometers; 0-50 mv.*

Transmitter converts a dc primary electrical signal into a 3-15 psi pneumatic output for controllers and receivers.

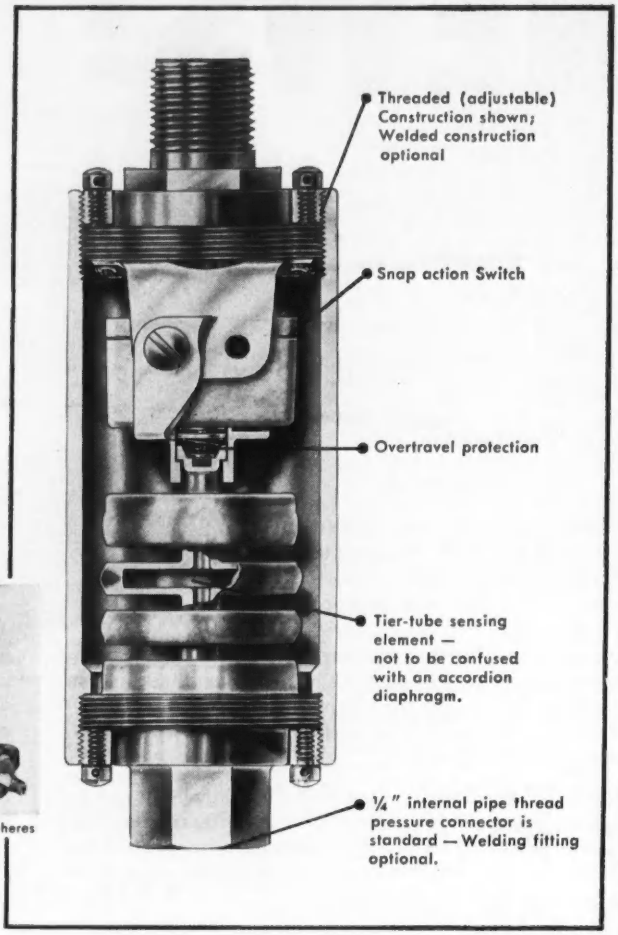
Taylor Instruments **MEAN ACCURACY FIRST**

Check 4058 opposite last page

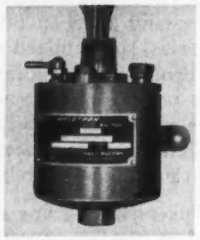
PRESSURE SWITCHES FOR **HIGHLY CORROSIVE** MEDIA

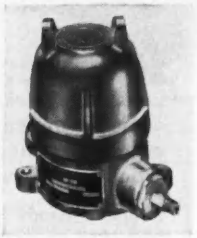
This new tier-tube line of Meletron pressure switches is available in materials suitable for use with concentrated hydrogen peroxide, fuming nitric acid, liquid oxygen, proprietary amine fuels, fluorine, mixtures of fluorine and liquid oxygen and others.

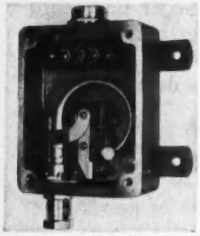
Proof pressures range from 224 to 6000 P.S.I., pressure settings from 2 to 4800 P.S.I. Switches will operate in temperatures from −65° to +275° F. Standard pressure port fitting is ¼" internal pipe thread but may be substituted by special welding fitting. The housing serves as a pressure tight safety capsule in case of a break in the sensing element. Single pole double throw switching elements are rated to 10 amps., for AC and DC circuits. Free leads or Cannon plug are optional for electrical connection. As an added safeguard, the stainless steel models will withstand 2000° heat for five minutes.

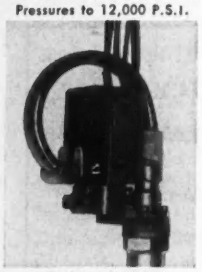

Threaded (adjustable) Construction shown; Welded construction optional
Snap action Switch
Overtravel protection
Tier-tube sensing element — not to be confused with an accordion diaphragm.
¼" internal pipe thread pressure connector is standard — Welding fitting optional.

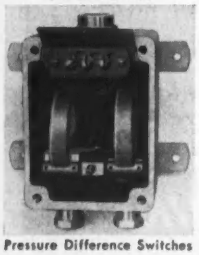
For Long Operating Life


Vacuum and LOW Pressure


For Explosive Atmospheres


Pressures to 12,000 P.S.I.


Skeleton Switch


Pressure Difference Switches

A complete line of several hundred standard models, off-the-shelf items, includes everything from vacuum to 20,000 P.S.I. proof pressure.

All have these features built in:

ACCURACY and DEPENDABILITY
maintained during operating life due to direct acting design.

We don't use

LINKAGES and BEARINGS
which as they wear, make the setting of the pressure switch drift.

OPERATION IN ANY POSITION
which saves the installation costs encountered in mounting a switch that uses liquid switching elements.

We don't use

LIQUID SWITCHING ELEMENTS
which make the switch difficult to mount and very critical to vibration.

IMMUNITY TO VIBRATION
you can mount the switch directly on your vibrating or moving equipment.

We don't use

ACCORDION DIAPHRAGMS
which make the pressure switch sensitive to vibration.

BARKSDALE VALVES
PRESSURE SWITCH DIVISION
5125 ALCOA AVENUE • LOS ANGELES 58 • CALIFORNIA

Check 4059 opposite last page

tical path of "test" beam. Comparison cell in other beam patch contains a pure comparison, usually nitrogen.

After passing through sample and comparison cell, the two beams unite in a beam combiner which focuses on a pneumatic microphone-condenser. Result is an electrical signal of amplitude proportional to difference in infrared absorption between test sample and reference sample. On amplification, this signal actuates a recorder calibrated to read directly in ranges of CO, CO_2, CH_4, CO-CO_2.

Calibration of recorder is:

Component	*Range*
Carbon Monoxide - Carbon Dioxide	0 - 100 ppm
Carbon Dioxide	0 - 2%
	0 - 33 ppm
	0 - 100 ppm
	0 - 2%
Carbon Monoxide	0 - 100 ppm
	0 - 2%
Methane	0 - 2%

Results: Since installation in Fall of 1955, infrared analyzer has proven of great value. Company has been well satisfied with the performance of instrument. Only regret is that it was not purchased sooner than it was. Instrument permits operating personnel to rapidly diagnose operating difficulties and it has been of great help in plant start-up operations.

(M-S-A Lira Infrared Analyzer is product of Mine Safety Appliance Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.)

Check 4060 opposite last page.

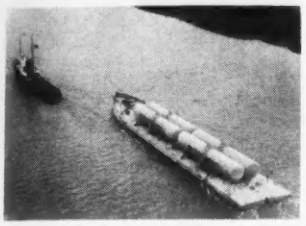
Petrochemical engineering

Brochure of 28 pages describes complete engineering and construction services provided for the petrochemical and petroleum industries. Broad list of processes offered cover the entire field of petrochemical manufacturing from ethylene and acetylene to complex organics. Bul 2547 — Chemical Plants Div., Blaw-Knox Co., 300 Sixth Ave., Pittsburgh, Pennsylvania.

Check 4061 opposite last page.

Butadiene shipped from US to Italy by barge

Accompanying photograph shows the first of several overseas shipments of American-made butadiene from Port Neches, Texas, to Revenna, Italy. Manufactured in Port Neches by Goodrich-Gulf Chemicals, Inc., the 2200-ton cargo is an experiment in the long-distance



transportation of butadiene by barge. Butadiene will be used by the Italian company, ANIC, to produce synthetic rubber. Barge shipments are being made by Warren Petroleum International Corp. of Tulsa.

Air engineering

Eight-page publication discusses heat removal by the air method. Apparatus covered includes aftercoolers, air conditioners, liquid coolers, heat exchangers, condensers, and refrigeration equipment. Bul 135 — Niagara Blower Co., 405 Lexington Ave., New York 17, N. Y.

Check 4062 opposite last page.

Data system will log hundreds of variables

Data can be basis of computer control

Uses: Automatic data handling system translates industrial data into language both humans and electronic computers can use.

Features: Data accumulated by system can be basis of future computer-control processing.

Description: Nerve center of data handling system is digital potentiometer so precise that

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In every length of WELDCO Pipe and Tubing, you get quality, uniformity, dependability . . . because WELDCO is produced by specialists—men who have the experience, equipment and facilities to make Pipe and Tubing to your exact specifications.

WELDCO (and only WELDCO) is welded with the exclusive Double-Fusion process. It's available in Stainless Steel, Monel, Inconel, Nickel, Cupro-Nickel, Hastelloy, and Titanium, in Pipe and Tube sizes from 3" to 30", Schedules 5, 10, and 40. When you think of top-quality, dependable Pipe and Tubing, think of WELDCO. A letter or phone call puts our 30 years of specialized experience to work for you.

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You're 'Way Ahead With WELDCO

WELDCO
THE YOUNGSTOWN WELDING & ENGINEERING CO.
3718 Oakwood Ave., Youngstown 9, O.

WELDCO

Check 4063 opposite last page

it can detect changes as minute as one part in four thousand in temperature, pressure, and similar variables. It is also flexible enough to be adapted to changing processes or transferred from one process to another.

Measurements are edited and converted into digits which are typed or put on punch cards. Pin board of machine functions like a telephone switchboard to pre-select and measure specific data.

"Robot" nerve center of data handling system translates industrial data into language "brains" can use

(Automatic data handling system is product of Brown Instruments Division, Minneapolis-Honeywell Regulator Company, Wayne & Windrim Avenues, Philadelphia 44, Pa.)

Check 4065 opposite last page.

Teflon-lined pipe

Four-page publication describes Teflon-lined pipe which furnishes excellent corrosion resistance with the strength of steel. Teflon is formed into housing by a process which compensates for thermal expansion and contraction differential between the two materials. Bul TS-1 — Resistoflex Corp., Roseland, N. J.

Check 4066 opposite last page.

For more information on product at right, specify 4067 . . . see information request blank opposite last page.

"I cut welding time when

B&W Welding Fittings

are specified!"

"From my own experience, I know that B&W Welding Fittings are dimensionally accurate and fit-up fast and positive. Welding time is reduced and one can make a trouble-free permanent joint. That means lower piping costs."

THE dimensional accuracy of B&W Welding Fittings makes a welder's job easier and helps to make his work more precise. Trouble caused by poor fit-up to pipe is eliminated. Every fitting has true circularity, full radius and walls of uniform thickness, which result in time saved in installation, top-quality joints, and helps to achieve a permanent, leak-proof, piping system. Write for bulletin FB504.

B&W Welding Fittings and Forged Steel Flanges are available in a complete range of types and sizes in carbon steel and the B&W CROLOYS.

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION • FITTINGS DEPARTMENT
3839 WEST BURNHAM STREET • MILWAUKEE 46, WISCONSIN

FA-8903-FEI

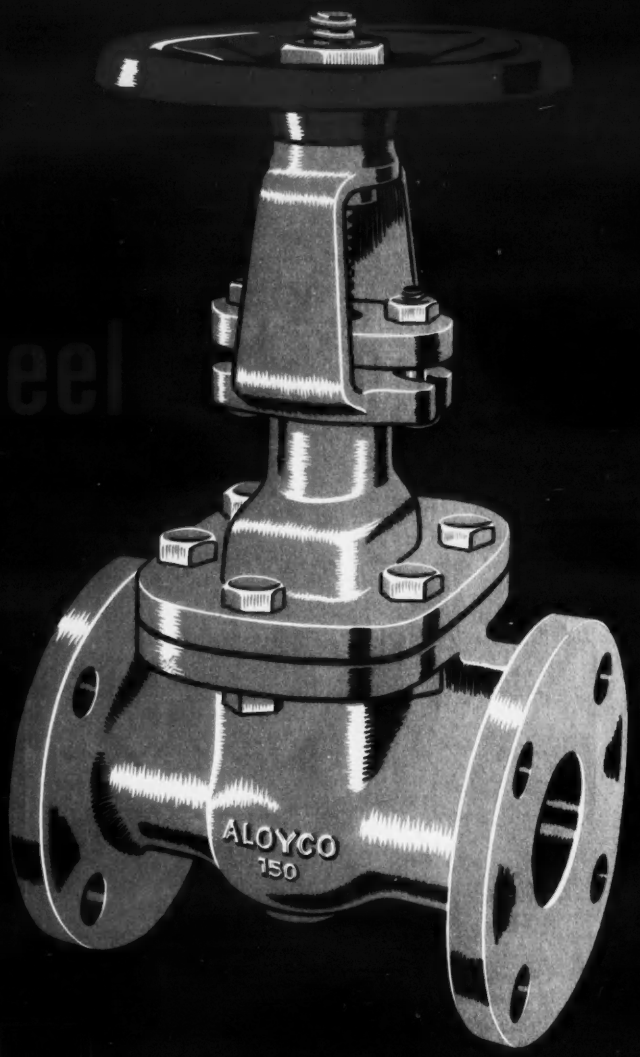
Seamless welding fittings and forged steel flanges, seamless and welded tubular products, solid extrusions — in carbon, alloy, stainless steels and special metals.

Check 4064 opposite last page

we make

stainless steel valves

...nothing else



ALOYCO 111 Gate Valve for 150 lb. service features double disc ball-and-socket wedges. They are free to rotate and are non-fouling in any position which insures tight closure. There are Aloyco valves and alloys designed for every type of corrosive service.

SPECIALIZATION! Isn't it reasonable to believe that the one company with experience, facilities, research and service all devoted to a single product is your best source of supply? The modern Aloyco foundry, for example, is designed to produce one end product only: pressure-tight Stainless Steel Valve castings of the finest quality.

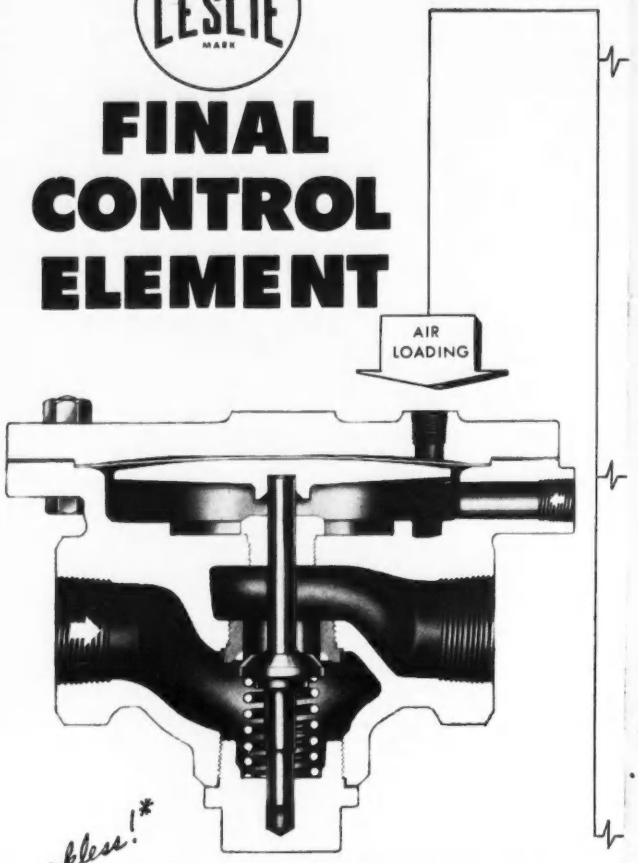
ALLOY STEEL PRODUCTS COMPANY

LINDEN, NEW JERSEY

Longer Lasting
ALOYCO
VALVES

1ST IN CORROSIVE SERVICE

A NEW LESLIE FINAL CONTROL ELEMENT



packless!*

A REALLY VERSATILE CONTROL VALVE — with only two moving parts and a metal diaphragm*

Now, simplified instrumentation combines the simple air loaded, Leslie diaphragm operated valve with various air operated devices. This is the valve that filled a real need when introduced about a year ago, wearing a 3-year guarantee against maintenance in normal pressure reducing services.

This new final control element is gaining wide acceptance for use with a variety of pneumatically operated controllers — simplifying pressure reductions, temperature regulation, remote stop valve applications and many process steam control services.

Ideal for "problem" installations

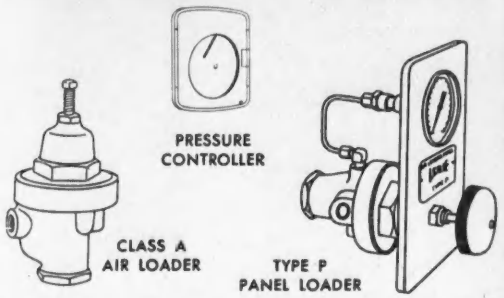
This control valve is ideal for either continuous or intermittent service and has remarkable immunity to dirty steam. Furnished in cast iron, sizes ½ - 2", it is suitable for any steam service up to 250 psi, 450F, and many fluid services.

It's simple — it's accurate

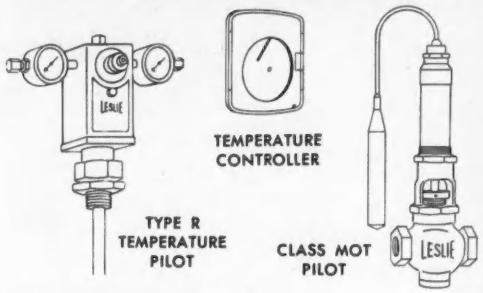
This Leslie control valve has only two moving parts ... no fussy seals, no stuffing boxes, no small dirt-catching parts; yet, with all its simplicity, it provides uncanny accuracy with its double* feed-back action. It lends itself readily to remote adjustment, too.

OPERATE THIS CONTROL VALVE With ANY Of These PNEUMATIC DEVICES

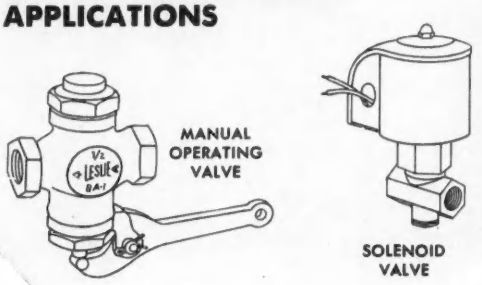
PRESSURE REDUCTIONS



TEMPERATURE REGULATION



REMOTE STOP VALVE APPLICATIONS



More Information

Ask your Leslie engineer to tell you more about this really versatile valve and the simplified instrumentation "packages" now available. You'll find him listed in your classified directory under "Valves" or "Regulators" and eager to come up with new ideas for simplifying pressure, temperature and liquid level control systems.

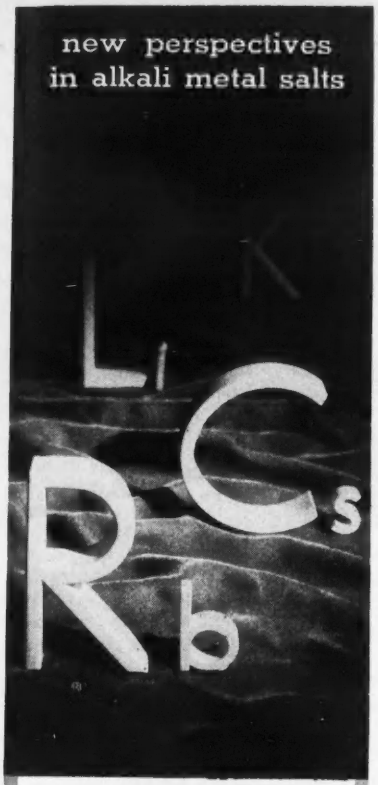
Send for Bulletin 561-A

* These are the President's comments — even the ad manager didn't know all the fine features!

LESLIE REGULATORS and CONTROLLERS

646 281 Grant Avenue, Lyndhurst, New Jersey

Check 4068 opposite last page



Now! RUBIDIUM and CESIUM SALTS available for evaluation

American Potash & Chemical Corporation—basic in the salts of all five alkali metals—now offers Rubidium and Cesium salts at substantially reduced prices. Immediate availability of these interesting compounds... most highly reactive of the alkali metals... permits their evaluation for wider industrial use. We offer the following compounds for your consideration:

RUBIDIUM:	Carbonate (Rb_2CO_3); Sulphate (Rb_2SO_4); Chloride (RbCl); Fluoride (RbF).
CESIUM:	Carbonate (Cs_2CO_3); Sulphate (Cs_2SO_4); Chloride (CsCl); Fluoride (CsF).

TRONA *For further information call your nearest Trona* representative, or write*

MARKET DEVELOPMENT DEPT.

American Potash & Chemical Corporation

3030 West Sixth Street, Los Angeles 54, Calif., DUnkirk 2-8231 | 99 Park Avenue, New York 16, N.Y., OXford 7-0544

*TRADEMARK AP&CC

Check 4069 opposite last page

Pension, Welfare Funds

From page 31

ployer, or a number of different employers. They are insured or self-insured. They provide a fixed level of benefits or whatever benefit a fixed amount of money will provide.

The registration of requirements of the legislation we propose are designed to cover all these different types of plans.

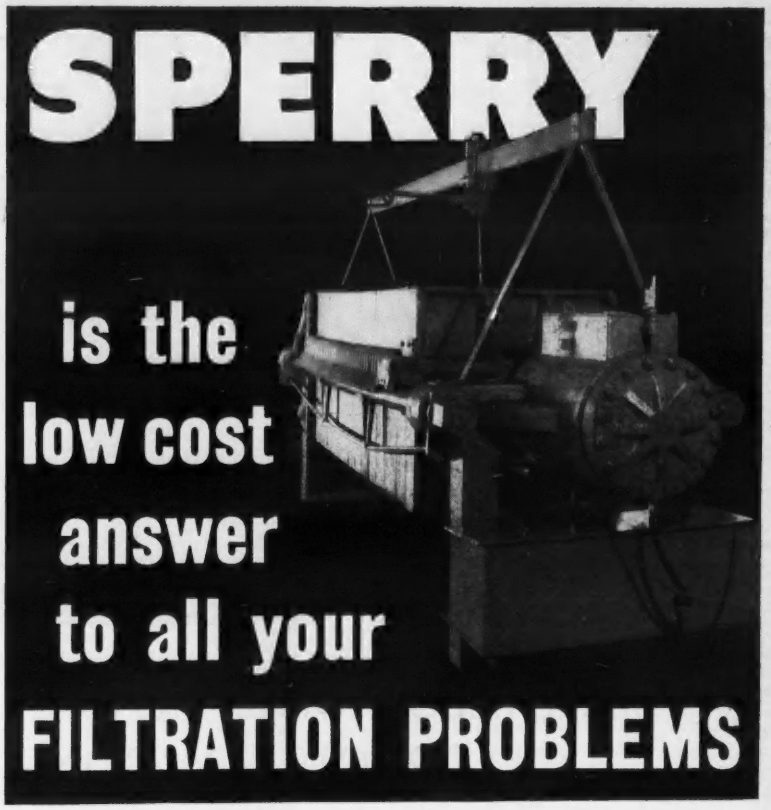
Administration

In a new program of this kind, it is important to permit some degree of discretion regarding particular information to be required. This flexibility, within the limits of standards set by Congress, would have the advantage of permitting the administrative agency to benefit from experience derived from the operation of the program.

The agency could then make informed recommendations to Congress for any modifications in legislation which might be found to be necessary or desirable.

In conclusion, I should like to state that in legislation of the kind outlined here the Federal Government would not attempt to solve the entire problem in the area of employee welfare and pension plans. This legislation would leave to the States their responsibilities for auditing and supervision of the funds. Also, the plan administrators themselves have a definite responsibility for good management. I believe the proposed legislation would encourage and assist State action and lead to improvements in management of plans that would be in the interest of the beneficiaries.

Pension and welfare fund disclosure legislation is the first proposal of a series which the Administration considers necessary to safeguard the interest of union members and their families and the integrity of union operations. Closely related to it are the recommendations which will be made to Congress to require unions to file annual financial and other reports with the Department of Labor and to make the books and records of union affairs available to their members. ■



Consider all the money-saving aspects of a Sperry Filter Press. These include low initial cost . . . nominal installation . . . minimum maintenance . . . low depreciation . . . and an economy of operation that extends through many years of trouble-free performance.

However complex your filtration problems may be, these economies are basic to the solution.

You can avail your plant to the economies of a Sperry Filter Press, custom-engineered to meet your particular requirements for flow rate, cake build-up, washing, extraction, thickening, etc. Variations are provided, offering center, side or corner feed; open or closed delivery; simple or thorough washing; high or low temperature control. Plates may be had in aluminum, wood, iron, bronze, stainless steel, lead, rubber, nickel or any other special materials to meet your requirements. Any filter media can be used . . . cloth, synthetics, wire screen . . . paper. Labor-saving plate shifting devices and semi-automatic closing attachments are adaptable for any model . . . to increase production, minimize operation hazards and reduce wear and tear.

FOR A LOW-COST ANSWER TO YOUR FILTRATION PROBLEMS, SEE THIS SPERRY CATALOG . . . an up-to-date fully illustrated reference manual of erection, operating, design and construction data and specifications. Mail coupon for your free copy today.

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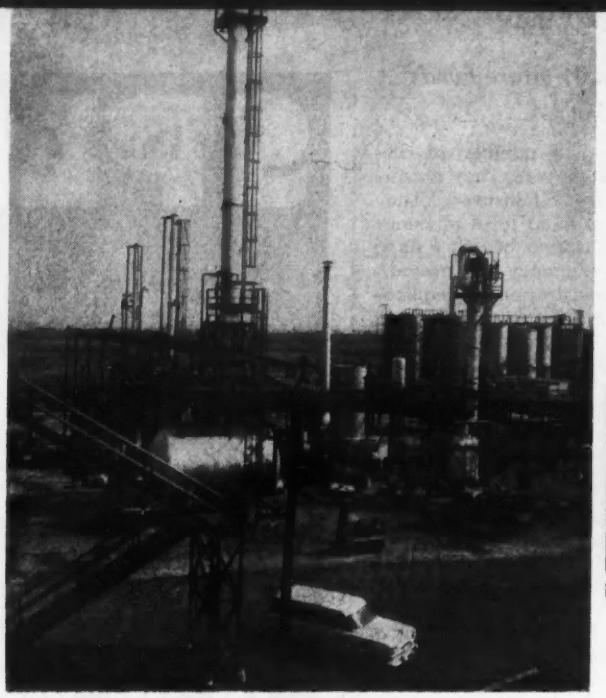
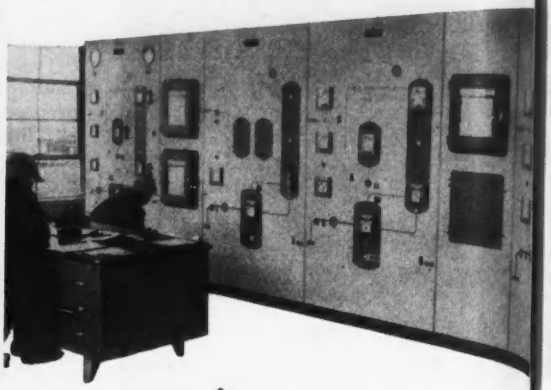
Check 4070 opposite last page



All-electronic plant enables toll refiner to operate within close margins of profit. Tall column in center can be controlled within fractions of a degree centigrade . . . yet built-in flexibility permits fast changes of operating parameters



Central control panel allows operation of entire plant from one point

Simplicity of installation . . . and apparent ease of maintenance . . . strongly favored selection of an electronic control system at Truland Chemical Company. In operation over a year . . .

ALL-ELECTRONIC PLANT IS PRECISELY CONTROLLED . . . YET FLEXIBLE

Dr. DANIEL FRIEDLAND

Vice President
Truland Chemical Company
East Rutherford, New Jersey

Problem: As toll refiner and purchaser of by-products for upgrading, Truland Chemical Company operates on volume basis, with extremely close margins. First rule of plant operation is "top yields **must** be secured."

List of products processed by Truland Chemical Company begins with acetone, amyl acetate, amyl alcohol, and runs to vinyl acetate and xylene. Organic by-products of all kinds are economically up-graded.

Approximately two years ago, Truland Chemical resolved to build a completely modern distillation plant. Several all-purpose stills were desired — units that could be operated either batch or continuously.

Typical of difficulties involved in designing the fractionating systems was that various solvent systems were to be run in the same equipment, requiring different control concepts. Also, in production of relatively pure chemicals, small increments in fractionating temperatures can permit too great a change in composition. Another problem is delayed response of a column to changes in control points.

Solution: Variety of materials and frequent changing dictated choice of final system installed. It is of a conventional batch (sometimes continuous batch) fractionation system . . . with all-electronic control and electro-hydraulic actuators. Choice of electronic versus pneumatic was made entirely on an evaluation of initial costs of the two systems.

When initially considering control system, engineers wanted completely automatic operation so that information and data could be "poured in" to the panel-board, with the system running by itself by means of timing devices. However, frequency of changes in materials processed dictated system by which all components are controlled from a centrally located control room.

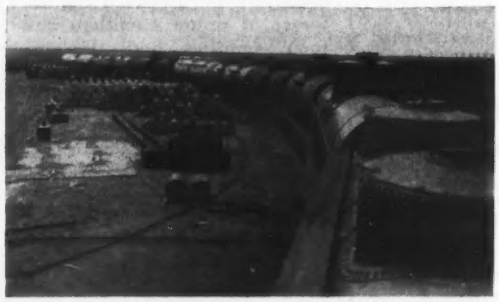
How Units Are Controlled

Kettle level is controlled by conventional liquid level and flow controls. Base tower pressure, which is an indication of rate at which vapors are generated as liquid flows down in column, is controlled by conventional loop. Temperatures in column actuate control valve in overhead product line to control amount of reflux. Composition of product is thus controlled. Conventional flow and level controllers handle reflux pot.

Every phase of system has appropriate alarms. High levels, low levels, extreme pressures, excess temperatures, are all indicated by a scanning-type alarm system. Even pumps cutting on and off are linked to alarm system on central control board.

Description of System

Instrumentation on unit number one is adapted to provide temperature measurement all the way up the column through range of 135 to 550°F. Temperatures are measured at five different points. Thus dynamic aspects can be kept under control. Unit number two, made largely of stainless steel, is a simple pot still with column. Temperatures



Tankcars received at Truland Chemical Company contain solvent mixtures and organic by-products for custom distilling. Facilities of all-electronic plant permit product to be handled in tankcar, tank wagon, . . . even drum size batches

are taken at only three points throughout the column. Unit number three is essentially same as number two (but not stainless) except that temperatures are also recorded at both top of still and in receiver. Unit number four is much the same as unit number one except that column is not quite as long and only three temperature points are used for control.

In each of the systems described, switch controls permit recording from any point selected throughout any one of the systems.

Interchangeability

Recorders and indicators used are of miniature design, operating on 115v 60-cycles power. Both recorders and indicators are interchangeable with each other.

Design of recorder or indicator is such that pen position is measured by a differential transformer which produces an AC voltage proportional to pen travel. This voltage is compared to a 0.000 to 0.500 AC voltage from primary element transmitter. Difference between voltages is amplified and is fed to a rotary solenoid to produce force to drive the pen or pointer to a null-balance position.

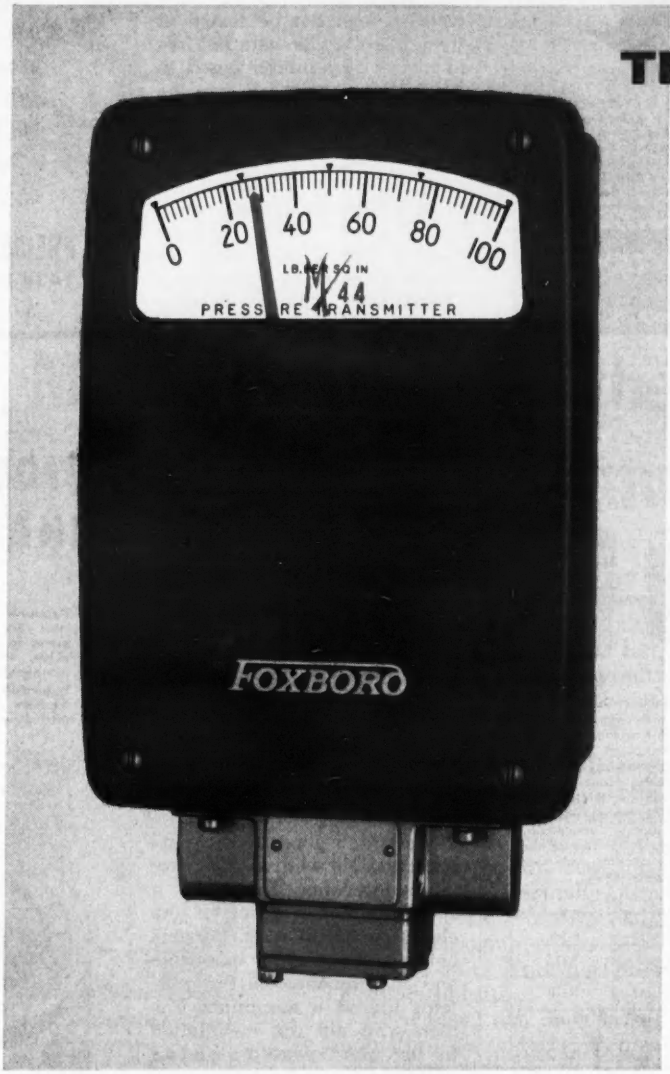
Primary Signal

Fully electronic control units may be incorporated in either controllers or indicators. The control units are operated by the same primary signal from the transmitter. A feature of this control system is the absence of any moving parts in the control circuit; from transmitter to valve actuator it is completely electronic.

Adjustment of the set point knob positions the core of a separate differential transformer to produce a signal. This signal is compared with the transmitter signal and the difference (known as the error signal) is amplified and converted to DC. The DC output signal operates the electro-hydraulic actuator on the valve. The controller action is such that the "error" signal is reduced to zero with maximum

read pressure up to 20 ft. away!

on the FOXBORO M/44 INDICATING PRESSURE TRANSMITTER



You can check pressure readings at a glance on the Foxboro Pneumatic Indicating Pressure Transmitter. Its open-face, horizontal, 4-inch indicator scale and eye-catching red pointer are clearly visible as far away as 20 feet.

But high readability is just part of the story. Actually, this instrument was engineered from the ground up. Makeshift arrangements have been eliminated, hung-on gauges are gone. Everything is included in one, neat, ready-to-install package.

Because the indicating pointer is direct-connected to element and transmitter, calibration is easy . . . and you can re-zero the transmitter externally. All M/44 components are standard, performance-proved Foxboro parts. This makes it easier to stock and service.

From its compact, drawn-steel case to its tough, polyester plastic cover the M/44 is the high-efficiency, low-cost pressure transmitter for centralized control and operation. All standard ranges.

Write for complete details. The Foxboro Company, 813 Neponset Ave., Foxboro, Mass.

FOXBORO
REG. U.S. PAT. OFF.
INSTRUMENTATION FOR INDUSTRY

Check 4071 opposite last page

speed consistent with stability. Manual control unit provides "bumpless" transfer.

Because there are no slidewires, resolution is infinite; the absence of mechanical parts eliminates hysteresis.

Design of instrument is such that it has sensitivity of 0.1% or better. Accuracy is ± ½% of full scale.

Few Maintenance Problems

System is designed to permit easy maintenance. Controllers need not be tested at the panel. Units can be immediately interchanged in whole or in part for convenient checking on the instrument bench.

With basic elements of the control units mounted on plug-in printed circuit cards, sub-control units covering proportional band, reset or rate, can be slipped into place or removed without disturbing a single wire connection. These in turn can be tested separately.

In essence, maintenance consists of isolating the malfunctioning unit, removing it from the panel, and substituting another unit.

Results: In the one year of operation almost no problems have been experienced, either in the transmitter or control equipment. Nor has there been any difficulty with the electrohydraulic operators.

As a matter of fact, company has had the very rare experience of installing these many loops and having them function almost from the beginning as well seasoned performers.

The utter simplicity of installation as well as the ease of maintenance has been a strong factor in favor of the electronic installation. Personnel requirements for operation and maintenance of the systems are at a minimum. The men who did the installation in the plant were regular plant employees who had no previous background in instrumentation, electronics, or electricity. People responsible for actual maintenance of the equipment are high school graduates with specific training at the company whose

Lumenite

AUTOMATIC CONTROLS

ELECTRONIC LIQUID LEVEL
INDUSTRIAL TIMERS
TIME SWITCHES
MAGNETIC SWITCHES

Ask for Bulletin

FL—Liquid Level
FM—Milk Level
FN—Nonconductive Liquid
ITC—Ice Thickness
BH—Boiler Level

Ask for Bulletin

LT—Time Switches
PC—Program Clocks
CR—Cycle Repeaters
R—Time Delay Relay
RMC—Automatic Reset

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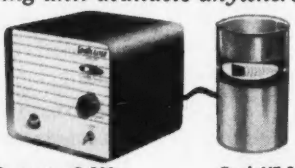
narda SONBLASTER

$175



Generator G-201 Tank NT-201

Now, no one need put off buying ultrasonic equipment because of cost! Narda's mass production techniques have done it again — this time, a 35-watt unit, complete with stainless steel transducerized tank with tremendous activity, at the lowest price in the industry—and with a 2-year warranty!

Hot lab apparatus, medical instruments, electronic components, optical and technical glassware, timing mechanisms—the Narda SonBlaster cleans 'most any mechanical, electrical or horological part or assembly you can think of—and cleans faster, better and cheaper. It's perfect, too, for brightening, polishing, decontaminating, sterilizing, pickling, deburring, and plating; emulsifying, mixing, impregnating, degassing, and other chemical process applications.

What's more, two tank sizes are available, and there's a duty cycle timer at only $10 additional. For more information, write to Dept. CP-4.

SPECIFICATIONS

Generator Model No.	Tank Model No.	Interior tank size (in.)	Tank Capacity	Price
G-201	NT-201	4-5/8 deep x 3-5/16 diam.	1/8 gal.	$175
G-201	NT-202	6-1/2 deep x 4-7/8 diam.	3/8 gal.	$210
Model G-202 Generator (same as G-201, but with duty cycle timer) available with either tank above, $10 additional.				

The SonBlaster catalog line of ultrasonic cleaning equipment ranges from 35 watts to 2.5 Kw, and includes transducerized tanks as well as immersible transducers which can be adapted to any size or shape tank you may now be using.

the narda ultrasonics corporation
118-160 HERRICKS ROAD • MINEOLA, L. I., NEW YORK
Subsidiary of The Narda Microwave Corporation

Check 4073 opposite last page

PRINCO laboratory thermometers are your assurance of everlasting legibility, easier readability and greater accuracy—for their STAZON markings will withstand the action of acids, caustics, and solvents, or any liquid which will not harm glass.

Look for the name STAZON enclosed in the infinity mark. It is your guarantee that the graduations and figures, which have actually become part of the glass itself, will remain legible for the life of the thermometer.

Write, wire or call for further information on this latest result of PRINCO research and development.

PRECISION THERMOMETER & INSTRUMENT CO.
1434 Brandywine Street Philadelphia 30, Pa.
Phone: Rittenhouse 6-6671

Check 4074 opposite last page

LIQUID LEVEL and INDUSTRIAL CONTROLS

Positive! Dependable! Economical! No floats! No moving parts in liquid. Unaffected by acids, caustics, pressures or temperatures.

Induction relays, magnetic contractors and starters. Special control panels.

WRITE FOR COMPLETE CATALOG

B/W CONTROLLER CORPORATION
2204 E. MAPLE ROAD BIRMINGHAM, MICH

FIRST IN THE FLOATLESS CONTROL FIELD

Check 4075 opposite last page

electronic equipment was purchased.

Electronic operation of the stills has meant that control can be maintained within ± 0.25°C over the range of operation. While this factor has been of great consequence, the advantages of easy maintenance and simplicity of installation have been of greater importance.

(Electronic instruments are product of The Swartwout Company, 18511 Euclid Avenue, Cleveland 12, Ohio.)

Check 4076 opposite last page.

(Electro-hydraulic operators are products of Askania Regulator Co., Div. of General Precision Corp., 240 E. Ontario St., Chicago 11, Ill.)

Check 4077 opposite last page.

Straight thermometer makes tank readings more accessible

Adjustable mounting nut allows head to be turned

Uses: Measuring temperatures of tanks, boilers, in high locations or other areas where it would be impractical to utilize standard angle form unit.

Features: Straight form thermometer has adjustable mounting nut making it possible to turn and lock head in position for best visibility.

Description: Straight form thermometer has dial face parallel to stem which contains bi-metal element. Instruments are made in both 3 and 5″ head sizes with stem lengths 2½ to 72″ long. Head is a heavy casting, finished in chrome with chromium plated bezel. Standard installation is with a ½″ NPT mounting nut, but special mountings are available.

Ten ranges cover temperature from −40 to 1000°F. Accuracy is within 1 percent of range over entire scale.

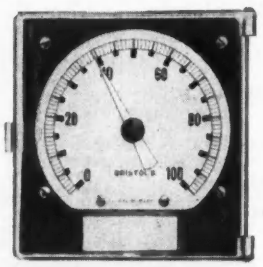
(Straight form thermometer Model V and X are products of W. C. Dillon & Co., Inc., PO Box 3008, 14620 Keswick St., Van Nuys, Calif.)

Check 4078 opposite last page.

Motor drive gives these miniatures high torque, unusual accuracy

No galvanometer type drive here!

Bristol Series 663 Miniature Electronic Dynamaster* Recorders and Indicators employ a two-phase, motor-driven, slide wire self balancing principle. Here's plenty of torque for operating alarm contacts, electric control contacts, or retransmitting slidewires. Dead band is only 0.15%. Here, too, is twice the accuracy . . . ½% of scale . . . you get in ordinary miniatures.



SAME INSTRUMENT also made as an indicator, interchangeable with recorder of similar characteristics in 10 seconds. Actual size: 5″ x 5½″.

Full plug-in flexibility, too. You can interchange chassis of the 663 in 10 seconds . . . replace it with either recorder or indicator instruments . . . both plug in easily without tools. Chassis also pulls out to intermediate position for chart changing and inking without disconnecting from circuit. Easy range change, too.

These features simplify planning of graphic control panels. They permit centralized recording and/or indicating of a large number of variables in minimum space. 15 miniatures mount in less space than two full sized units. Human engineering makes 3″ charts and dials easy and accurate to read.

Remember, too, only Bristol offers full lines of both full size and miniature instruments. You can count on unbiased recommendations and dependable instrumentation from Bristol. The Bristol Company, 141 Bristol Road, Waterbury 20, Connecticut. S.12

*T. M. Reg. U.S. Pat. Off.

BRISTOL TRAIL-BLAZERS IN PROCESS AUTOMATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

Check 4079 opposite last page

"So Simple to get ANY RPM"

ONE VARIDRIVE UNIT DOES IT all!

VARIABLE SPEEDS DIRECT FROM STANDARD AC POWER LINE:

- NO DC CONVERTERS
- NO DC GENERATORS
- NO ELECTRONIC TUBES
- NO SPECIAL MAINTENANCE TECHNICIANS

1/4 TO 60 H.P.

(Unit shown is 10 H.P. Horizontal Varidrive)

U.S. VARIDRIVE MOTORS

Why bother with DC Converter, DC Generators, complicated electronic tubes and circuits—when you can get "ANY RPM" from one U.S. Varidrive unit that's simple, completely self-contained, ready to plug into any standard AC power line! Varidrive is easy for ordinary personnel to maintain—no special technicians needed! Economical to install—efficient in operation—a single, compact speed unit! Specify: "U.S. Varidrive Motor."

Send for FREE VARIDRIVE BROCHURE No. 1797

U.S. Electrical MOTORS

Los Angeles 54, Calif. (Box 2058) or Milford, Conn.

Check 4080 opposite last page

INSTRUMENTATION

Bubbler control system holds liquid levels within 1/4 inch

Bubbler fitting in liquid is Teflon-coated

Uses: Air-operated control system will maintain liquids at constant levels for process uniformity, in spite of evaporation or causes for depletion.

Features: Bubbler system controls liquid levels within ¼ inch.

Description: Teflon-coated bubbler fitting is installed about three inches below liquid surface. Air at 15 psi is fed through line and also to a static pressure regulator. If liquid level drops, pressure on bubbler tip is reduced. Change is transmitted to static-pressure regulator to re-position diaphragm control valve on liquid supply line. Proper level is again reached.

Once installed, level of liquid can be adjusted over range of 1½ inches.

(Bubbler system is product of The Powers Regulator Company, 3434 Oakton St., Skokie, Illinois.)

Check 4081 opposite last page.

Computer information

Manufacturer offers two reprints covering computers in process industries and analog-to-digital conversion. Reprints S-11 and S-12 — Systems Div., Beckman Instruments, Inc., 325 North Muller Ave., Anaheim, Calif.

Check 4082 opposite last page.

Gives moisture content every 12 minutes

Fully automatic recorder is fast; saves labor

Uses: As moisture tester and recorder for powdery or granular materials.

Features: Moisture recorder is fully automatic, printing out results of moisture test every 12 minutes.

Description: Recorder samples main stream, or by-pass,

MARSH Mastergauge

The gauge that has everything!

- **LEAK-PROOF ONE-PIECE CONSTRUCTION** . . . bourdon tube fused to socket and tip by exclusive "Conoweld" process.
- **STURDY "MARSHALLOY" CASE** . . . formed of boiler-plate-thickness steel, copper clad inside and outside to give it the corrosion resistance of solid copper. It's one third lighter, but four times stronger than cast iron.
- **PRECISION "MASTERGAUGE" MOVEMENT** . . . with such exclusive features as the coined sector gear.
- **AVAILABLE WITH STAINLESS TUBE AND SOCKET** . . . choice of stainless steels and alloys for all corrosive conditions.
- **WITH "RECALIBRATOR"** . . . quickest and best way to keep a gauge accurate.

These features are combined only in "Mastergauge", standard bearer for the broad line of Marsh Gauges . . . each the best of its kind. Ask for data.

MARSH "THE STANDARD OF ACCURACY"

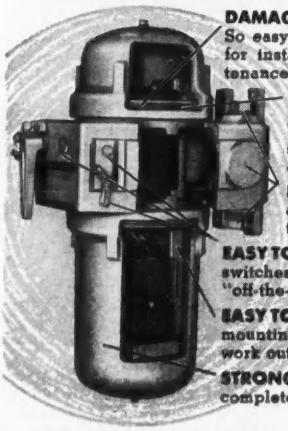
MARSH INSTRUMENT CO., Sales Affiliate of Jas. P. Marsh Corp., Dept. Z, Skokie, Ill.
Marsh Instrument and Valve Co. (Canada) Ltd. 8407 103rd St., Edmonton, Alberta.
Houston Branch Plant: 1121 Rothwell St., Sect. 15, Houston, Texas.

Check 4083 opposite last page

NEW SPIN TOP ENCLOSURE FOR HAZARDOUS LOCATIONS

4 SIZES for Starters 0 thru 5

CLASS I, GROUP C and D • CLASS II, GROUP E, F, and G



DAMAGE-RESISTING Acme thread. So easy to put on and take off tanks for installation, inspection or maintenance.

REAL PROTECTION against rain, dust, dirt and weather because male threads on collar section engage female threads on tank.

INCREASED WIRING SPACE and through-feed conduit entrances for horizontal tap-offs.

EASY TO ADD pushbuttons or selector switches with easy-to-buy, easy-to-use, "off-the-shelf" parts kits.

EASY TO INSTALL • "Slide and Hook" mounting arrangement takes the hard work out of the installation job.

STRONG and LIGHTWEIGHT • The complete enclosure is cast aluminum.

Write for BULLETIN 9990. Square D Company, 4041 North Richards St., Milwaukee 12, Wis.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE

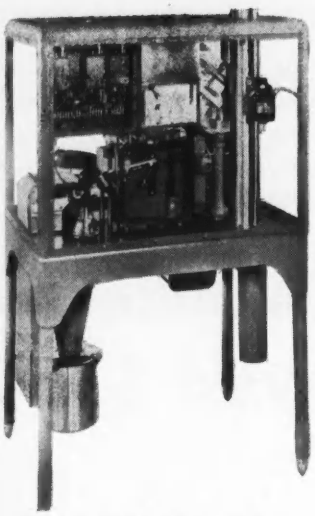
SQUARE D COMPANY

Check 4084 opposite last page

every twelve minutes. Ten-gram samples are weighed, dried with infrared lamp, and then re-weighed.

Weight loss is recorded on a continuous-strip chart and dated.

Time of drying can be varied according to needs. Analytical balance mechanism is accurate to ±0.002 grams. In-



Moisture tester-recorder will run tests 24 hours a day

strument can be operated 24 hours a day, seven days a week, without difficulty.

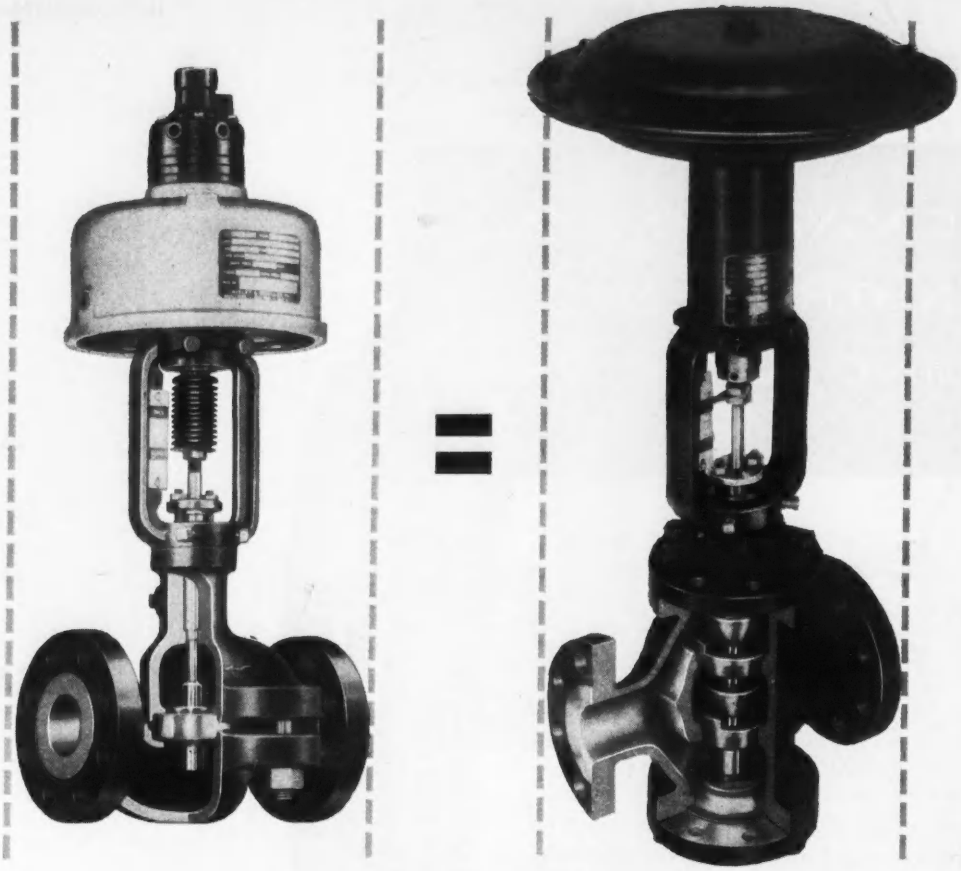
(Model CM automatic moisture recorder is product of Brabender Corporation, Rochelle Park, New Jersey.)

Check 4085 opposite last page.

Liquid-metal controls

Manufacturer's series of six bulletins describe control components for liquid-metal systems. Components are designed for use in nuclear, metallurgical, petroleum, and chemical fields. They are pumping, purification, and indicating components for liquid sodium (NA) and sodium potassium (NAK) systems. Buls GEA-6453A, GEA-6454A, GEA-6456A, GEA-6457A, GEA-6360A, and GEA-6395A — General Electric Company, Schenectady 5, N. Y.

Check 4086 opposite last page.



"FIT" Companions

reduce costs . . . increase valving flexibility

With face-to-face dimensions to I.S.A. standards, K&M split body valves are interchangeable with K&M regular globe-body diaphragm valves (and with all standard makes of diaphragm valves).

This *exclusive* feature of the K&M split body design enables you to make significant reduction in your plant inventory investment of replacement valves. It gives you highly desirable flexibility.

Additional flexibility is provided in the K&M split body valve itself. Interchangeable. unitized construction makes it possible to develop 432 different valve combinations from a single split body.

In a matter of minutes you can make the body reverse or direct-acting; switch the operator to dome, diaphragm, or handwheel; change the seat ring to one of several types; recharacterize by selecting a different plug; substitute the replaceable, rotatable flanges; convert from globe to angle type.

The K&M split body valve fits your existing piping and fits your budget.

One more plus . . . K&M split body valves have the largest C_V offered in split body construction . . . more flow for your money.

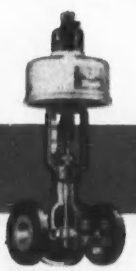
Write for Catalog 132 completely describing the valve that brings the split body idea to its fullest development.

K&M

diaphragm control valves

Our 79th Year

S.A. 1887



KIELEY & MUELLER, INCORPORATED

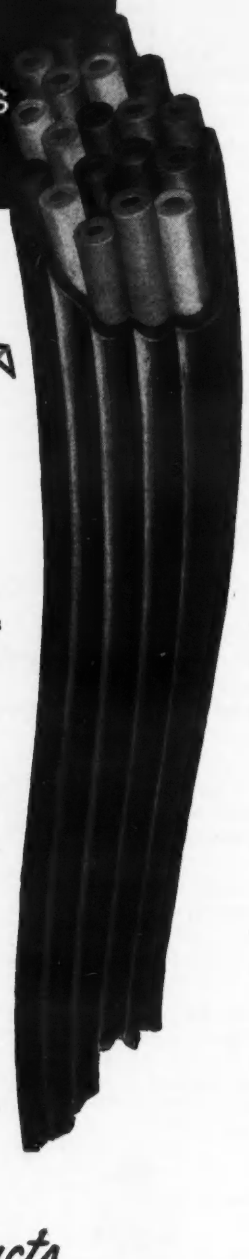
Oldest Pressure and Level Control Valve Manufacturer

64 Genung Street, Middletown, New York

Check 4087 opposite last page

DEKORON PRODUCTS CUT INSTRUMENT TUBING COSTS

EASY-TO-INSTALL INSTRUMENT LINE HARNESS



DEKORON Poly-Cor is a tried and proven instrument tubing bundle having advantages of light weight, corrosion resistance and extreme ease of installation.

It is completely color-coded with 7 colors of tubing so placed in the bundle that each tube is easily identified by its relation to the other colored tubes. Their natural resiliency resists physical damage. Harness composed of from 2 to 37 (19 *illustrated*) individual lines is available.

Initial cost . . . installation . . . corrosion resistance . . . maintenance—*no tubing can compare with patented Dekoron Poly-Cor.*

Request Bulletin 456.

Use Dekoron E-Z Tube Fittings. Specifically designed for use with Poly-Cor or with single-line plastic Dekoron "P" Tubing.

AA-4804

Dekoron® products

quality research service

SAMUEL MOORE & COMPANY • MANTUA, OHIO

DEKORON PRODUCTS DIVISION

Check 4088 opposite last page

Conductivity cell (arrow) transmits variations in concentration to controller actuating solenoid to add fresh water only when necessary ▶

Although water was plentiful, management at Grigsby Allison realized that saving water meant saving money. By automatically controlling flow to plating rinse tanks, company maintained product quality . . .

cut water use, saved $160

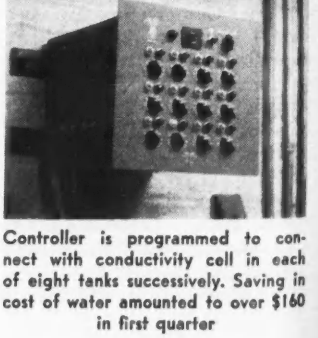
THEODORE W. WETT
Assistant Editor
With **V. M. PRYBYL**
Plant Manager
and **ALBERT R. STEDRY**
Supervisor, Plating Dept.
Grigsby Allison Inc.
Arlington Heights, Ill.

Problem: Dollars were going down the drain at Grigsby Allison. Water for rinse tanks in plating line was turned on at beginning of shift and allowed to run continuously. By this method, concentration of contaminating ions in rinse bath was held to that of "fresh" water even though it was not necessary from a product quality standpoint. Bath is used in plating line to remove residual solution from parts being processed, after preliminary cleaning and final plating step.

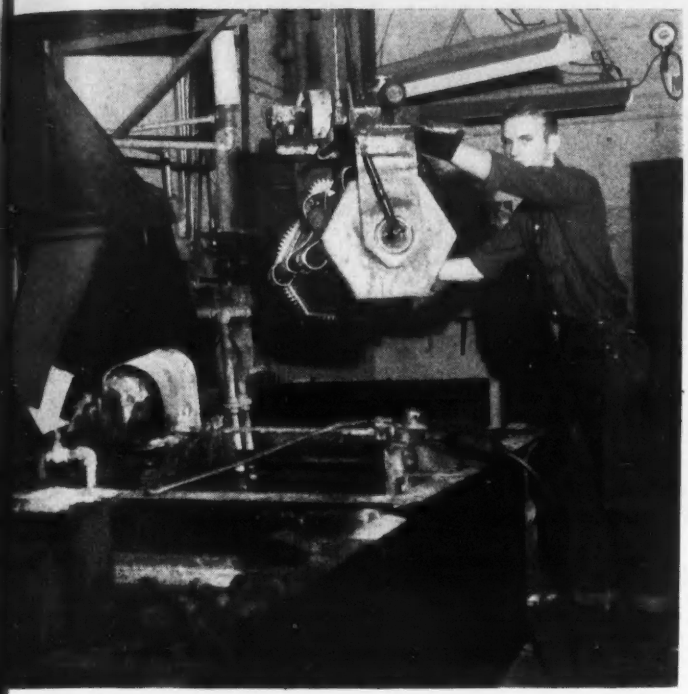
Management realized that this method, although satisfactory from standpoint of results obtained in finished work, was expending considerably larger quantities of water than necessary. Line can handle cadmium, copper, silver, nickel, and gold plating, and aluminum chromate coatings.

Products from plating line are used by Grigsby Allison in switches, tuners, and other electrical components for radio, TV, and electronic devices.

Solution: In May 1957, company installed an automatic control system on eight rinse tanks. Controller is a line-voltage energized AC Wheatstone bridge. It contains a measurement circuit and a



Controller is programmed to connect with conductivity cell in each of eight tanks successively. Saving in cost of water amounted to over $160 in first quarter



in first quarter

vacuum-tube relay circuit operated directly by unbalance of bridge circuit. One leg of measurement circuit is external conductivity cell immersed in remote rinse tank. Variations in chemical concentration of rinse water in the tank affect this cell which in turn changes bridge measurement current.

Conductivity cell consists of two flush rings of graphite in bore of a heavy-walled epoxy tube. Cell measures conductivity of liquid column between graphite electrodes.

Vacuum-tube relay circuit operates when ion concentration in rinse water, as measured by increasing conductivity, exceeds pointer setting on controller panel. Pointer reads directly in units of specific conductance (mhos). Electrolytic conductivity is a non-specific measurement of all ions present in a solution.

Instrument is first calibrated for conductivity of fresh water; then maximum allowable ion concentration is determined by trial. This maximum is manually set by pointer.

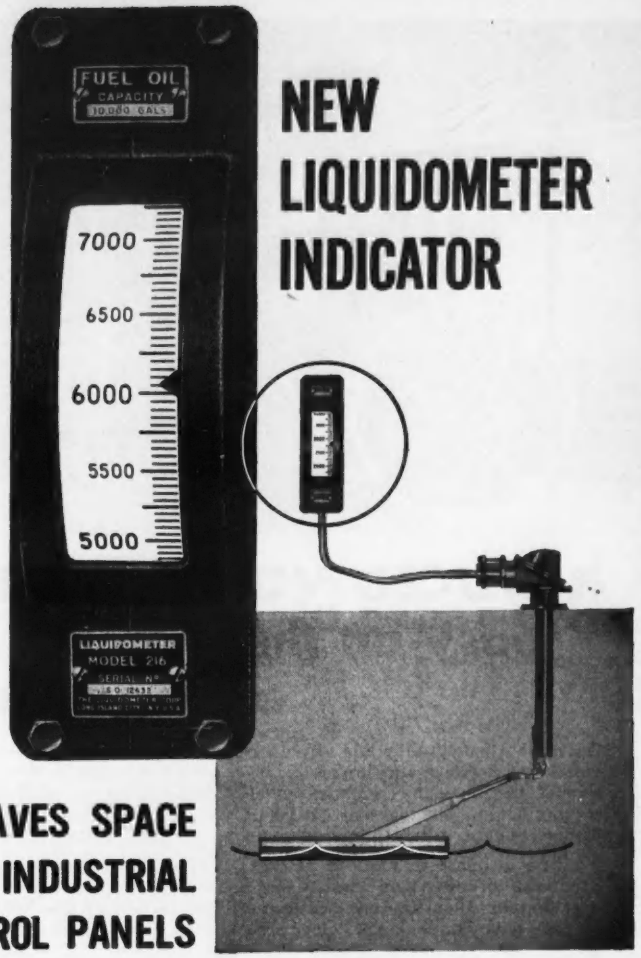
Controller itself is adjustable over a wide range of ion concentrations, and can be used to detect electrolyte build-up of any nature. Basic controller has been used for measuring effectiveness of washing of soluble electrolytes in centrifuging or filtering operations.

In operation, relay-circuit energizes solenoid valve which admits enough fresh water through a ½"-line to affect immersed cell and rebalance bridge circuit, whereupon solenoid closes.

Controller is automatically connected to conductivity cell in each tank for a period of 10 seconds, successively. Indicator lights show particular tank being tested. Alarm lights indicate tanks calling for water.

Each station, or tank control, may be set independently of others.

Results: In the quarter preceding installation of rinse-tank controller, Grigsby Allison used 1,832,000 gal of water for plant operations. This was approximately the average for past consumption. Cost of



NEW LIQUIDOMETER INDICATOR

SAVES SPACE ON INDUSTRIAL CONTROL PANELS

Twenty-inch dial in 3x10¼" case permits close readings

The new Liquidometer Model 216 Indicator gives the plant engineer a reliable, automatic reading of storage tank contents. Available in either vertical or horizontal design, the compact and highly readable Model 216 Indicator makes possible multiple installations on crowded control panels.

Teamed with Liquidometer's time-tested hydraulic transmission gaging system, the new indicator provides instantaneous remote indication of liquid levels—automatically. No outside power source is required. Virtually any liquid may be measured, and the indicator can be located up to 250 feet from the tank.

Engineered for dependability, the Liquidometer gaging systems highlight these design features:

- Maintenance free
- Integral temperature compensation
- Ease of installation—requires only one 2" diameter tank opening
- Safety—all gages Underwriters approved for hazardous liquids

For further details on the new Model 216 Indicator, write Dept. D.

LIQUIDOMETER INSTRUMENTS

THE LIQUIDOMETER CORP.
SKILLMAN AVENUE AT 36th STREET
LONG ISLAND CITY 1, NEW YORK

Check 4089 opposite last page

this amount was $658.60. During quarter in which unit was installed, and therefore used only part of the time, water consumption dropped to 1,685,000 gal, at a cost of $584.50. During first quarter in which unit was operating full time, only 1,455,000 gal of water were used and cost dropped to $498.00.

Since plant operations remained constant during this time, reduced water usage can be attributed almost completely to operation of rinse-tank controller, with savings amounting to over $160.00 in one quarter. In addition, city sewage charge is based on quantity of water consumed. This charge was also reduced.

High quality of plating work was maintained, of special importance in electronic applications.

(Model ARPT-12 multi-point rinse-tank controller was supplied by Industrial Instruments Inc., 89 Commerce Rd., Cedar Grove, New Jersey)

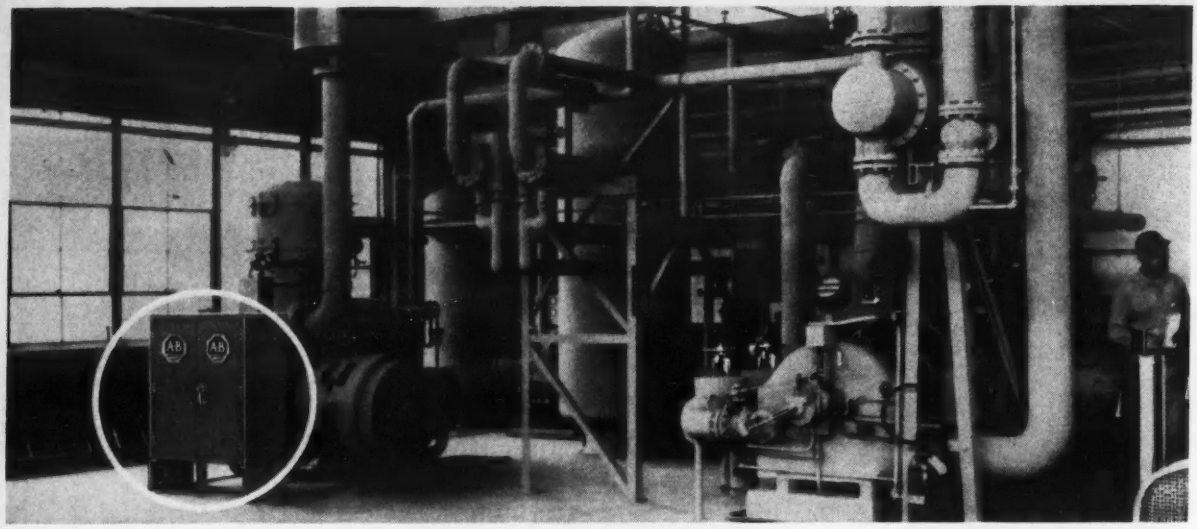
Check 4091 opposite last page.

'Highly satisfactory' Parshall flume reduces costs

Three month test proves general accuracy

Problem: Merck, Sharp and Dohme plant, Division of Merck and Company, provides sanitary and waste treatment facilities for approximately 1000 employees and many research processes. Week-day raw sewage flow averages 160,000 gallons. Metering of water and sewage is absolutely necessary to ascertain correctly the amount of sewage being absorbed by water sources.

Solution: Waste control engineers at Merck installed a Parshall flume unit which eliminated need for breaking through several feet of concrete and the installation of necessary equipment required by stilling wells. Unit has a 4" diameter stainless steel float and float rod. Core and coil transmitting device mounted in the waterproof casting is



A-B Bulletin 746 automatic autotransformer starter for compressor supplying dry air in bulk plastics plant.

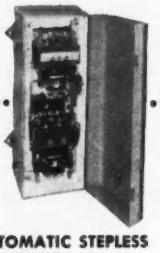
REDUCED VOLTAGE STARTERS
easy on the motor . . . easy on the line

Only the Allen-Bradley line of reduced voltage starters can completely satisfy your motor and machine starting needs . . . *whatever* these may be. Starting "jolts" that can shorten the life of the equipment, or also cause damage to "parts" being produced, can be eliminated. The high current inrush, often resulting in objectionable lamp flicker, can be brought within the power company's requirements.

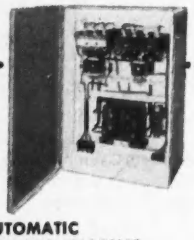
For the ultimate in reduced voltage starting, the compression resistor starters—produced only by Allen-Bradley—are *unequaled* for velvet smooth motor and machine acceleration. Allen-Bradley transformer-type starters are also "tops" in their field. All starters have double break, silver alloy contacts that never need maintenance.

Please call your A-B control engineer—he will help you select the correct starter for your needs. You cannot go wrong when you specify Allen-Bradley . . . the *quality* motor control.

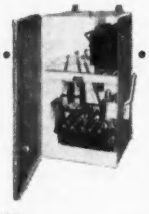
Allen-Bradley Co., 104 W. Greenfield Ave., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.



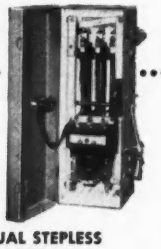
AUTOMATIC STEPLESS RESISTANCE
Bulletin 740 has graphite disc resistors automatically inserted in line for smooth starting. Ratings to 200 hp, 220-440-550 v.



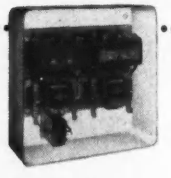
AUTOMATIC AUTOTRANSFORMER
Bulletin 746 uses autotransformer in open delta to reduce line voltage. Taps on transformer to adjust voltage. Ratings to 300 hp, 220 v; 600 hp, 440-550 v.



MANUAL AUTOTRANSFORMER
Bulletin 646 has air break, silver alloy contacts. Rated 75 hp, 220 v; 150 hp, 440-550 v. Also made with oil-immersed contacts. Bulletin 646 is a strictly "modern" starter.



MANUAL STEPLESS RESISTANCE
Bulletin 640 has graphite compression disc resistors for stepless starting. Operated by a hand lever. Ratings to 200 hp, 220-440-550 v.



PART WINDING STARTERS
Bulletin 736 for use with suitable squirrel cage motors having separate parallel stator windings. Ratings to 200 hp, 220-440-550 v.

A-B QUALITY

ALLEN-BRADLEY
QUALITY
MOTOR CONTROL

Check 4090 opposite last page

attached to side of flume. Float rides on surface of water, immersed only ½". Float activates recording meter by means of coil transmitter.

Results: After three months use, Merck, Sharp and Dohme have found the unit to be "highly satisfactory" in accuracy and general operation. Unit has been virtually maintenance free. Up to 35%, it is estimated, have been saved in installation costs by eliminating need for conventional stilling.

Float rides in channel through which debris flows unimpeded

(Parshall flume is product of Penn Instrument Div., Burgess-Manning Co., 4110 Haverford Ave., Philadelphia 4, Pennsylvania.)

Check 4092 opposite last page.

Detergent formulation controlled by load cell system

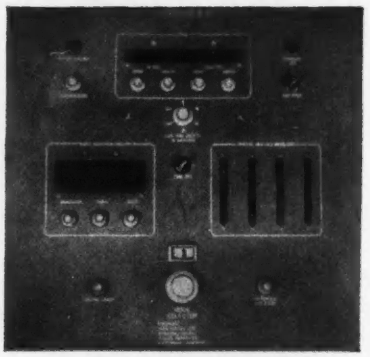
No variation greater than 5 lb in 27,000

Problem: Variation of more than 5 lb in weighing a 27,000-lb batch of detergent slurry might affect both foaming qualities and cleansing properties of Glim, made by B. T. Babbitt, Inc., Albany, New York. Inaccurate weighing could result in rejected detergent formulation.

Solution: Babbitt engineers installed a load-cell weighing system in 1955. Purpose was to

Kybernetes data handling equipment proven 99.7% reliable by 37,851* hours of in-plant performance!

* covering the 12 installations made during the past year.



Unmatched accuracy and reliability are achieved and sustained in the Kybernetes Data Handling System by the incorporation of advanced, fully proven techniques. The Kybernetes System provides a new, all electronic concept for the acquisition of process or test information for logging, monitoring and computing. This equipment is designed for accuracies of 0.1% for all inputs, including non-linear types, over extended periods of operation.

The Kybernetes all electronic approach to data handling provides the most direct means of digitizing low level inputs. Discrete counts, proportional in number to the magnitude of the input variables, are stored in digital form ready for direct reading into the printer or display panel. Complex analog to binary encoding and subsequent binary to digital decoding are completely eliminated.

Components having marginal operating characteristics are eliminated from Kybernetes' Data Handling Equipment, which contains no servos, stepping switches or other mechanical operations.

FEATURES OF KYBERNETES DATA SYSTEMS INCLUDE:

A — Provision to record sequential or simultaneous readings of any quantity of inputs.

B — Chopper amplifier with exceptional frequency response, linearity and gain stability as well as high noise rejection and true isolation of input and output circuitry.

C — Individual, hermetically sealed plug-in relay switching providing reliable long term commutating of input signals.

D—Specially developed linearization techniques whereby the generated comparison voltage is characterized to conform exactly to the individual non-linear characteristics of the different types of variables.

E—Plug-in, hermetically sealed components to conform to Class I, Division II requirements for semi-hazardous areas and to provide for ease of maintenance and service.

ON REQUEST: Authoritative Technical Bulletin 108a fully describes latest logging, monitoring and computing equipment. Write for free copy.

KYBERNETES®

Data Handling Equipment for Industry
logging/monitoring/computing

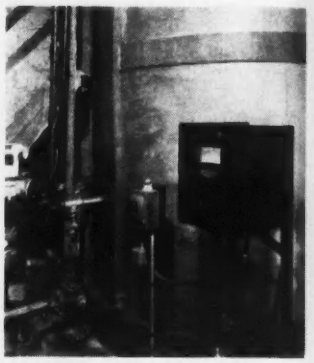
THE KYBERNETES CORPORATION 9 East 40th Street, New York 16, N. Y. Division of Self Winding Clock Co., Inc.

Check 4093 opposite last page

cut costs, reduce lost time.

Detergent slurry arrives at plant in tank cars. Following analysis, slurry is used for Glim formulation in 4000-gal stainless steel blending tank. Operator weighs each batch for accurate formulation.

Installation of weighing system uses steel frames supported at 3 points on concrete floor and load cell. Two-thirds of tank's weight rests on cell. Remaining load is supported by 2 "I"-beam members.



Extended scale dial indicator and load cell system weigh detergent batches accurately

Completely-enclosed load cell device has no moving parts. Temperature compensating resistors maintain accuracy over wide range of temperatures. Weight reading is given on dial indicator at operator's station.

Results: Load cell weighing system has given accurate weight consistently, to 0.02%. Compactness of system has allowed installation of tank to within 9″ of ceiling.

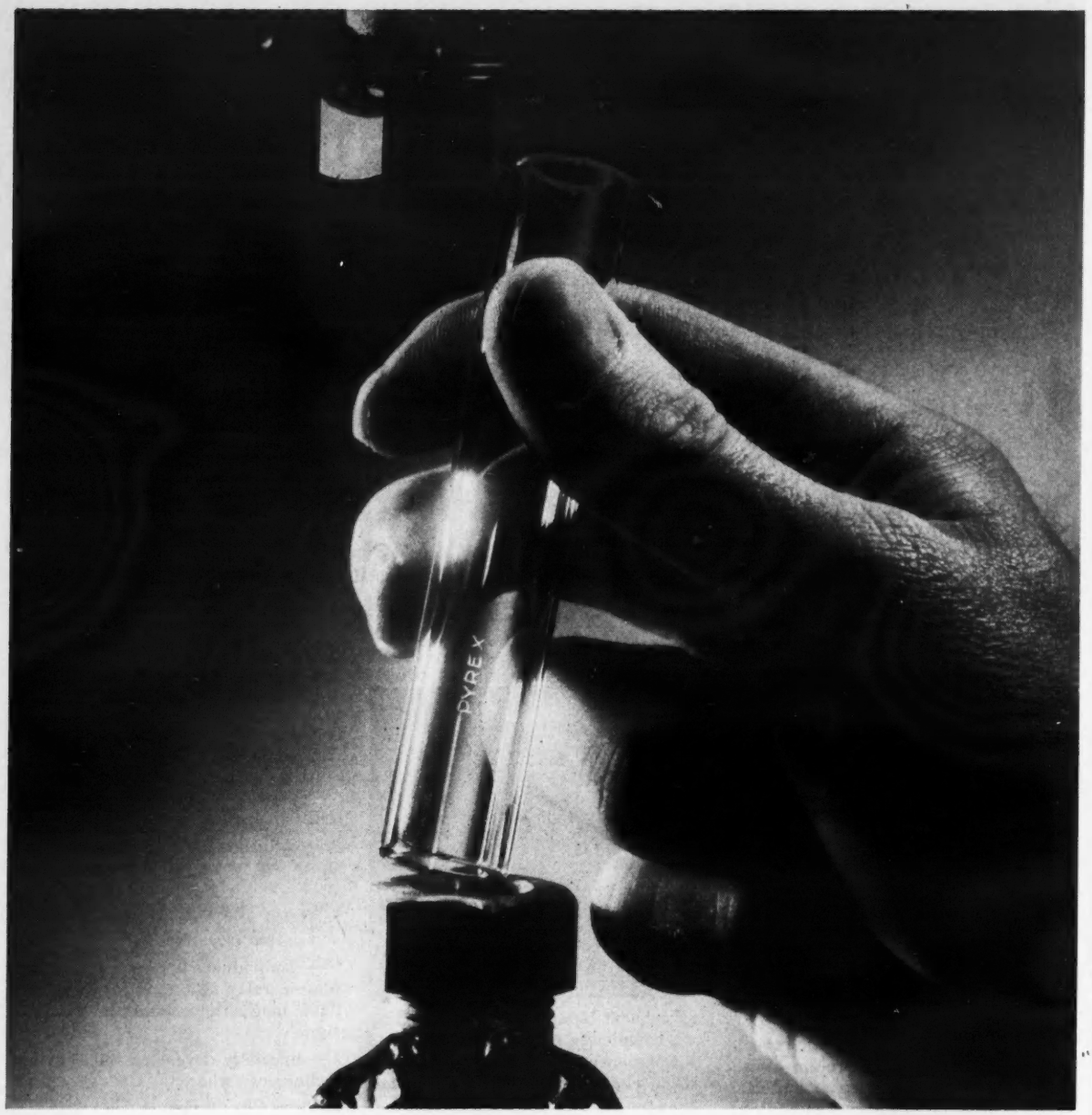
(SR-4 load cell is product of Baldwin-Lima-Hamilton Corp., 42 Fourth St., Waltham, Massachusetts.)

Check 4095 opposite last page.

Cake thickness detector

Bulletin of four pages defines and describes construction and operation of detector which automatically measures thickness of cake on the filter leaf. Bul EF/7 — Enzinger Div., The Duriron Co., Inc., Angola, New York.

Check 4096 opposite last page.



A gauge glass installed...and two more on the shelf

Make short work of gauge glass replacement—when the replacement is as near as your stockroom shelves. You'll cut down time.

Take *three* gauge glasses the next time you order from your distributor. That gives you *one* for the gauge right away, a *second* for regular replacement, a *third* to cover special emergencies.

And here's another tip—don't rely on any old type gauge glass. Insist on regular replacement with PYREX®, CORNING®, or MACBETH® to avoid trouble.

These gauge glasses last longer—because they're harder to break! They stand up better to just about every clouding hazard. They easily resist high temperatures and high pressures.

One of these brands is just right for your gauge. Get some from your regular mill supply dealer. And remember—ask for *three* for each gauge!

(Corning makes sight glasses, too—from tough PYREX brand glass. Use them whenever you must see what's going on inside your processing equipment. Your distributor has them.)

Corning means research in Glass **CORNING GLASS WORKS, Corning, N.Y.**

Check 4094 opposite last page

Small lamp sockets

Catalog of 28 pages details manufacturer's line of sockets for small lamps used in electrical or electronic products. Technical descriptions are provided for each group of sockets together with actual-size illustrations of various designs. Cat S-557 — Leecraft Manufacturing Company, Inc., 58-60 Greene St., New York 12, New York.

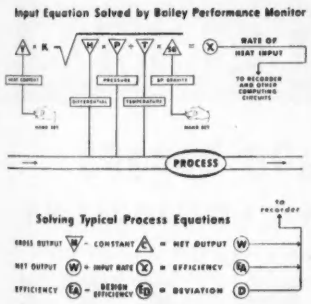
Check 4097 opposite last page.

Actual measurements serve as source for monitoring

Process monitor solves performance problems

Uses: Providing instantaneous and continuous determinations of process performance.

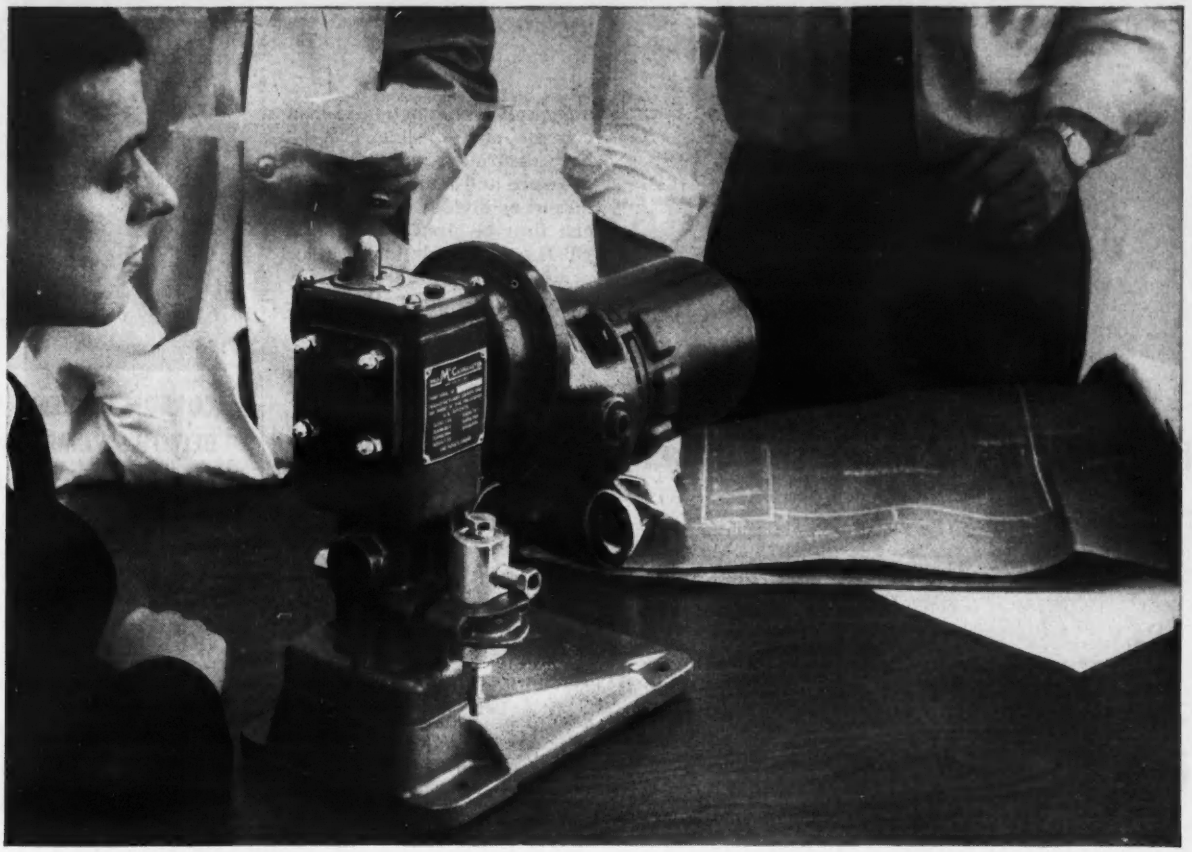
Features: Performance monitor operates continuously from actual field measurements.



Many process equations can be solved by performance monitor

Description: On-line analog computer records on circular charts performance factors as unit efficiency, percent yield, heat rate, etc. Computed intermediate functions as total fluid flow in terms of Btu can also be presented. Further factors as deviation of any measured variable or computed function from design and test standards and cost per unit output can also be shown. Results are then transmitted to information system for logging.

Typical of input equations that can be solved by monitor is in illustration. Rate of heat



You're looking at a new metering pump that offers greater accuracy, takes less space

Meet the new McCannameter!*

Here you see management, laboratory and process personnel getting acquainted with a packless pump that provides accurate metering and proportioning over a wide output range. Each is interested in its new compact design that takes only ⅓ the space previously required. Each likes the continuous flow characteristics available through the entire capacity range. Capacity is adjustable while in operation . . . pumping at pressures up to 2500 psi. The McCannameter is available with either Teflon-faced diaphragm or metallic bellows, depending on your needs.

The new, improved McCannameter is ready to provide these same benefits in your industrial process, pilot plant or laboratory. It assures you of precision and dependability. To really get acquainted, send today for full information. * PAT. APPLIED FOR

SEND FOR NEW BOOKLET
"McCannameter—The Meter That Pumps" gives the inside story of precision, versatility and reliability. Write for your free copy of Booklet No. 302.

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4571 West Touhy Avenue, Chicago 30, Illinois
Specialists in Diaphragm Valves and Proportioning Pumps

hills-mc canna company
THE PEOPLE WHO KNOW AND CONTROL FLOW

Check 4098 opposite last page

input can be a function of heat content and specific gravity, both controlled manually, and pressure and temperature. Net output as divided by input rate can thus be used to arrive at efficiency. Calculations can be carried on from there in many directions, all done automatically by the computer.

The on-line analog computer uses servo-amplifier measuring equipment and slide wire, plus cam-actuated movable core, transmitters.

(Performance monitor is product of Bailey Meter Company, 1050 Ivanhoe Road, Cleveland 10, Ohio.)

Check 4101 opposite last page.

Automatic control

Manufacturer's series of five application engineering data sheets covers condensate level control for digester heaters, pump discharge control through adjustable speed magnetic drive, automatic control of positive displacement solution feeders, modernizing filter plant mechanical rate-of-flow controller, and sludge digester temperature measurement. Automatic control buls — The Foxboro Company, Foxboro, Mass.

Check 4102 opposite last page.

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Get this new buying guide

for LABORATORY and PRODUCTION OVENS

New 8-page color illustrated brochure describes re-designed models of four laboratory ovens and six production type ovens in Standard, Heavy Duty and Super Duty Capacities.

Comprehensive diagrams showing the Despatch "Whirlblast" Forced Air convection systems are included. Construction and engineering features are clearly illustrated by separate photographs of important components. Pictures show typical installations and give specifications of 10 models of gas and electric fired ovens in the Despatch "V" series. Discover how Despatch Engineering Service can help you with your selection of a new oven that will exactly fulfill your needs.

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with the Model CP-1 Sterling Hydraulic Drum Lift. Be assured of self-locking and absolute control at any pouring angle.

Lifting capacity 750 lbs. Lifting height 72". For complete details and specification on the CP-1 model and other model Sterling Hydraulic Drum Lifts, write:

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P. O. BOX 94 BROOMALL, PA.

Check 4100 opposite last page

CORSON-CERVENY MICRO BELLOWS PUMP Feeds Chemicals in Esso Research Bench Scale Pilot Plant

In setting up its bench scale pilot plant to solve many problems involving simple, continuous, or vacuum distillation, solvent extraction, or chemical reaction, Esso Research & Engineering have installed a Corson-Cerveny Micro Bellows Pump to pump a wide variety of chemicals.

The Corson-Cerveny Pump is used in many laboratories where corrosive chemicals are pumped because all parts in contact with the liquid are made of stainless steel, and cone-to-taper fittings eliminate the need for packing, which is always a source of possible contamination.

Why not let the Corson-Cerveny Pump help in your laboratories? Write for bulletin and prices.

RESEARCH APPLIANCE COMPANY
Box 307 Allison Park, Pa.

Check 4103 opposite last page

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shakes and breaks
FITTINGS and EQUIPMENT
unless you
STOP IT!

install Josam SHOCK ABSORBERS

At an unexpected moment a connection will burst or a mechanism break from repeated shocks caused by the rapid closing of a valve or faucet, the stopping of a pump action or any other operation that arrests the normal flow.

Avoid expensive shut-downs and repairs by installing Josam Shock Absorbers. Send now for free Manual SA for details.

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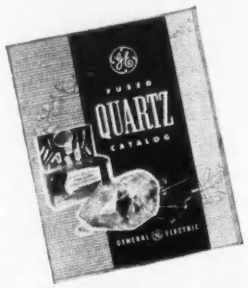
Free! Quartz catalog

19 FACT-PACKED PAGES ON CLEAR AND TRANSLUCENT TYPES

YOU'LL FIND complete information on fused quartz including discussions on mechanical strength, low coefficient of expansion, and its electrical and chemical properties. Graphic comparison of the ultraviolet, visible and infrared transmission of fused quartz and various glasses. It explains why fused quartz does most jobs better in laboratories and industry.



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SEND FOR YOUR FREE CATALOG TODAY! For this free engineering booklet on fused quartz, or further information on any phase of quartz and its uses, write: Lamp Glass-Quartz, General Electric Co., Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Check 4105 opposite last page

Describes thermocouples

Manufacturer's bulletin describes thermocouples made from metal-sheath ceramic-insulated wire to withstand heat to 2500°F and pressures to 50,000 psi. Accompanying bulletin describes metal-sheath ceramic-insulated wire. Bul 3.8 and 4 — Aero Research Instrument Co., 315 North Aberdeen St., Chicago 7, Illinois.

Check 4106 opposite last page.

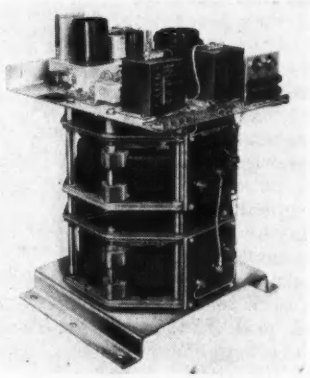
Increases tube life of control systems

Automatic voltage regulator extends reliability

Uses: Protecting life of vacuum tubes in sensitive electronic control equipment.

Features: Operation of voltage regulator is fully automatic and has built-in safety factors against surges.

Description: Voltage regulator is based on a combination of adjustable voltage con-



Automatic voltage regulator saves life of expensive vacuum tubes

trol and automatic voltage regulation functions. When equipment is energized, voltage through tubes is run-up gradually to minimize surge strain on filaments. Thus tube life is appreciably lengthened.

Control circuit automatically actuates at proper time to maintain stabilized output voltage level pre-set to maintain equipment at peak efficiency. Safety factor includes device that prevents equip-

Indicates set point and process variable at a glance!

plus . . .

- Standard proportional band 1-100% . . . also available to 150%.
- Proportional and differential gap actions easily selected with a screwdriver.
- Manual reset readily accessible. Automatic reset optional.
- Compact—8⅝" square x 4" deep.
- Pneumatic feedback circuit with sensitivity of 1/10% and repeatability of ½%.
- Available in a variety of temperature ranges; pressure ranges from 0-30" H_2O to 0-10,000 psi, and in vacuum ranges of 0-30" Hg.

No other pilot comes even close in a comparison of features with the USG Temperature or Pressure Pilot. The scope of applications is well beyond the range of ordinary pilots for flexibility and accuracy, and compares favorably with much more expensive controllers.

Write for descriptive catalog, or get it from your distributor . . . his name is in the "Yellow Pages" of your phone book.

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USG
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Check 4107 opposite last page

ment from being re-energized after power failure of more than 5 seconds duration. Voltage run-up takes 5 to 14 seconds depending on output voltage setting and previous conditions of operation.

Input is 208 volts ± 10% single-phase 57 to 63 cycles. Output is 208 volts nominal, adjustable from 163 to 208 volts. Accuracy is ±1.0% for rate line and load changes. Instrument is resistant to shock, vibration, corrosion, moisture, fungus. Other models are available.

(Automatic voltage regulator EM10018 is product of Superior Electric Company, Bristol, Conn.)

Check 4109 opposite last page.

Recording oscillograph is fast writing

Records are immediately usable without processing

Uses: Direct recording of up to 36 channels of high frequency information. Instrument will also be valuable where variables need to be monitored at instant they are being recorded.

Features: Direct-recording oscillograph produces records that are immediately visible and usable, recording directly on paper that requires no processing.

Description: Instrument has a frequency response of 3000 cps. Writing speed is up 20,000 in/sec, using 12-inch papers. Instrument's galvanometers deflect eight inches peak to peak. Traces may overlap — not being limited by adjacent channels. Unit accommodates 200 feet of record paper, which can be loaded in daylight. Indicator shows amount of unused paper.

Instrument has five speeds in each of three ranges — from 0.1 to 160 inches per second. All speeds are changed by pushbutton control.

(Direct-recording Visicorder Model 1012 is product of Heiland Division, Minneapolis-Honeywell Regulator Company, Denver, Colorado.)

Check 4110 opposite last page.

THE WORLD'S MOST EFFICIENT POWER EXHAUSTER FOR INDUSTRY

. . . FOR INSTITUTIONS

. . . FOR RESIDENCES

★ STATIC PRESSURE UP TO 12 INCHES

★ NO MOTORS, FANS OR BEARINGS IN EXHAUST LINE

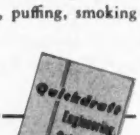
★ NEEDS NO STACKS ★ ACID RESISTING FINISHES

FOR INDUSTRY, Quickdraft provides up to 12 inches static pressure to **exhaust** paint spray, abrasives, corrosive gases, noxious fumes and high temperatures . . . **move** grains, powders, salts and trimmings . . . **recover** metallic waste from foundry stacks. It reduces maintenance costs . . . eliminates down-time for cleaning and replacing fan blades.

For INSTITUTIONAL AND COMMERCIAL BUILDINGS, Quickdraft eliminates costly, tall and unsightly stacks. It vents incinerators, heating plants and water heaters at roof level . . . safely and efficiently.

For RESIDENCES, Quickdraft maintains constant draft for efficient and economical combustion of all fuels. It keeps chimneys dry. It eliminates pulsating or chattering, puffing, smoking and sooting.

Write for QUICKDRAFT ENGINEERING DATA on your application . . . today.



N-587-QD

IMPORTANT NOTICE
For withstanding corrosive gases, all Quickdraft units are available in standard acid resisting vitreous enamel. No. 316 Stainless Steel, rigid plastics (P.V.C.), and with plastic and Fiberglas coatings.

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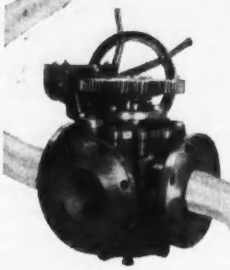
Check 4108 opposite last page

USE *Jacketed* PLUG VALVES



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- Viscous Materials

and heat with Steam, Hot Oil, Dowtherm, Hot Water

Sizes
1¼" x 2" to 8" x 10"

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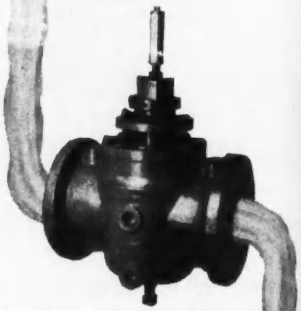
2 and 3 way
Lubricated
Non-Lubricated

Materials
In stock—Semi-Steel
On order—Ni-Resist
Ductile Iron, Steel, Stainless Steel

Operation
Standard—Wrench
On order—Gear, Air, Hydraulic



These jacketed plug valves have been used for over 30 years in service where reliable operation is demanded and extremes of operating conditions must be met. Heavier than standard flanges provide ample strength for highly stressed bolting and rough handling.

All valves are provided with a thrust ball screw adjustment under the plug to regulate seating. The screw is also used as a jack to free plug during disassembly.

Shipment
Stock on most sizes and types in Semi-Steel

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Parks-Cramer Company
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FITCHBURG 12, MASSACHUSETTS

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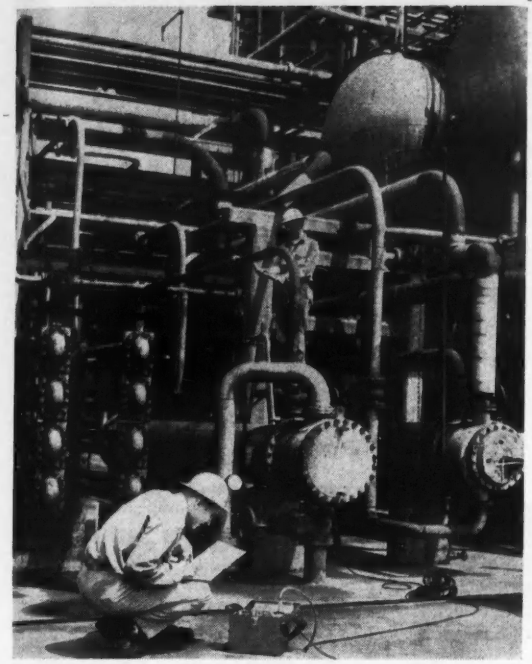


Inspection Engineers Robert Buhrow, reading meter, and Sam Hartley, inspecting a refinery pipe, use gamma-ray thickness measurement device

Gamma Ray Instrument Increases Maintenance Efficiency

WILLIAM C. CLARKE, Assistant Editor
With **ROBERT BUHROW,** Inspection Engineer
and **WALTER BRAUCKMANN,** Inspection Engineer
Inspection Engineering Department, No. 1 Refinery
Standard Oil Company (Ohio)

Problem: Failure to expedite piping inspection, which usually requires the breaking of pipe for calipering, can result in extended periods of expensive plant downtime. Also, inspection data can only be obtained adjacent to pipe flanges. Thus, direct mechanical calipering is impossible at many critical inspection points because of location. Another factor . . . should drilled test holes be used to inspect pipe lines at corrosive locations, their coverage is limited and time-consuming work is necessary to unscrew the test plugs in addition to measuring the thickness.

Solution: Using a gamma-ray device for piping inspection, inspection engineers at Sohio's No. 1 Refinery no longer find it a necessity to have most pipe flanges opened for inspection. Purchased in 1955, the wall thickness measuring device allows reading readily—and without breakage—the actual pipe wall thickness.

Description of Instrument

Gamma-ray source in tangential head emanates rays in a preferred direction which pass through material measured. Pipe thickness being measured is the average over approximately one square inch about the point of tangency. As gamma rays penetrate the material being tested they are diminished in proportion to material thickness. Detector current pulses, transmitted to a meter calibrated in inches, are produced at a rate proportional to the intensity of the radiation at the detector and are a function of source size, source-detector distance, and absorption by intervening mediums. Since gamma rays are not emitted in a steady stream but in bursts, instrument includes an integrating circuit to give constancy to indications and, consequently, accurate readings.

Use of instrument does not depend upon the molecular structure of material being measured nor upon its physical state. Passage of gamma rays through medium is affected almost entirely by density and thickness of medium. Since density is a known constant, thickness can be determined with an error of less than 3%. Pipe wall measurements have been made to plus or minus 0.005". It can be used for measuring steel up to approximately 0.90" thickness.

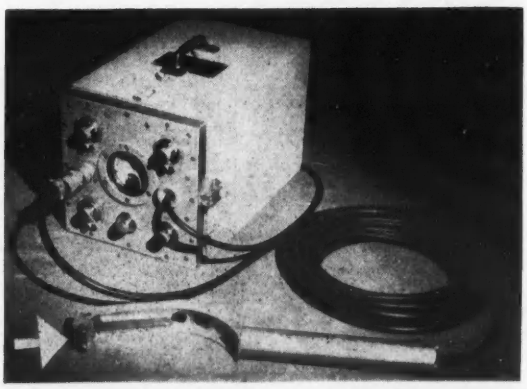
Results: Use of gamma-ray instrument for piping inspection at Sohio has resulted in shorter downtimes when they are dependent upon piping inspection. It has been found that 75% of the mechanical craft work formerly required to break piping for metal inspection has been saved since first use of instrument approximately two years ago. After some experience in its use, engineers have developed methods for optimum field positioning of the instrument allowing the necessary readings to be taken with minimum instrument movement. Now—large numbers of readings can be taken rapidly at almost any location for the purpose of producing data for statistical analysis purposes.

Engineers do not believe that any safety has been sacrificed with use of the instrument, but rather, safety has been increased as individual inspections are now quicker, and more can be accomplished.

An advantage of the instrument is that it allows inspection engineers to become more familiar with piping circuits in addition to providing a knowledge of which circuits require most attention.

("Penetron" wall thickness device is product of United Engineers, Inc., 824 East Sixth St., Tulsa, Okla.)

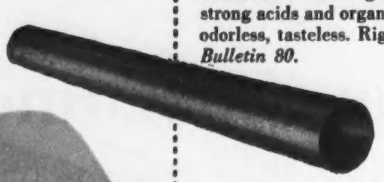
Check 4112 opposite last page.



Gamma-ray wall-thickness measurements device. Gamma-ray source at left (arrow) permits gamma rays to pass through material measured, falling directly upon detector in handle

TOUGH ACE-ITE PLASTIC PIPE

General-purpose moderately priced rubber-plastic pipe handles most common chemicals to 170 deg. F. . . . except few strong acids and organic solvents. Tough, odorless, tasteless. Rigid pipe ½" to 6". *Bulletin 80.*



ACE offers 100 years experience to

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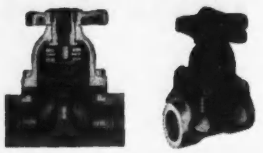
To prevent discoloration, taste, odor or metallic pick-up in your processes, you'll find the best, most economical piping, pumps, valves and tanks among the many ACE rubber and plastic materials. Wide range of temperatures, pressure, impact resistance. Phone nearest American Hard Rubber Company distributor, or write for Technical Data CE-50.

VALVES

for all-plastic piping systems



Trouble-free plastic diaphragm valves . . . choice of general-purpose ACE-ITE, ACE PARIAN (polyethylene) or ACE SARAN. Handles most corrosive chemicals and food ingredients. Sizes ½" to 2", 50 psi. at 77 deg. F. *Bulletins 80 and 351.*

RIGID VINYL . . . STRONG, AGE-PROOF

ACE RIVICLOR is a new rigid threaded plastic pipe with good aging and high impact strength. Not affected by most inorganic acids and alkalis, also excellent for many organics. Sizes ½" to 4". *Ask for Bulletin CE-56.*

1001 USES for ACE-FLEX Tubing

Excellent chemical-resistant, all-purpose flexible plastic tubing. Sparkling clear, easy to clean, odorless, non-toxic, can be steam-sterilized. ⅜" to 1" ID. *Bul. 66.*

ACE processing equipment of rubber and plastics

AMERICAN HARD RUBBER COMPANY
DIVISION OF AMERACE CORPORATION
Ace Road • Butler, New Jersey

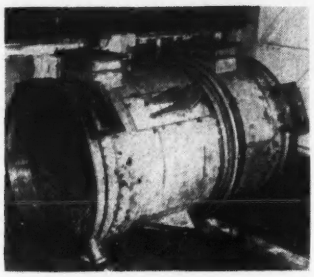
Check 4113 opposite last page

CORROSION CONTROL

Stainless heat exchanger converts chemicals at 1000°F

One of the largest ever built, all stainless vertical heat exchanger is used by leading chemical company as chemical converter operating at temperatures up to 1000°F. The exchanger measures 7½′ in diam by 10′ high. Tubes, tube sheets, shell and bonnets are all of stainless steel.

A bundle of stainless welded tubes 2″ OD x 12 ga x 10′ long gives a heating surface of 3900 sq ft. These tubes



Tubes of heat exchanger convey highly corrosive chemical catalyst during conversion process

convey a highly corrosive chemical catalyst during the conversion process. Exchanger has two fixed tube sheets and thermal expansion joint around shell circumference.

(Stainless heat exchanger was by Richard M. Armstrong Co., West Chester, Pa.)

Check 4114 opposite last page.

(Stainless steel for heat exchanger was supplied by Allied Tube Div., The Carpenter Steel Co., Union, N. J.)

Check 4115 opposite last page.

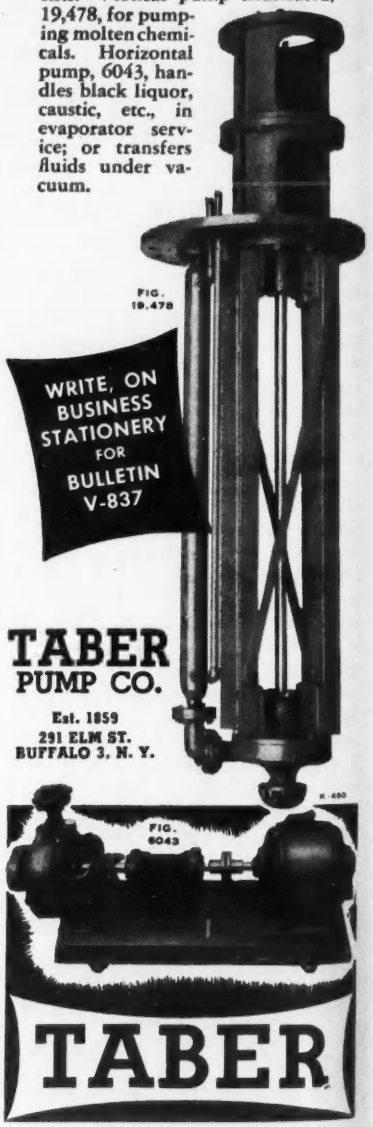
Scale, rust remover

Properties and uses of powdered acid scale and rust remover are described in four-page service report. Recommended solution concentrations and application methods are covered. Service report B-6564 — Oakite Products, Inc., 118F Rector St., New York 6, N. Y.

Check 4115A opp. last page.

PUMPING MOLTEN CHEMICALS? write TABER

Whatever your pumping needs .. why not put it up to Taber .. long experienced pump specialists. Vertical pump illustrated, 19,478, for pumping molten chemicals. Horizontal pump, 6043, handles black liquor, caustic, etc., in evaporator service; or transfers fluids under vacuum.

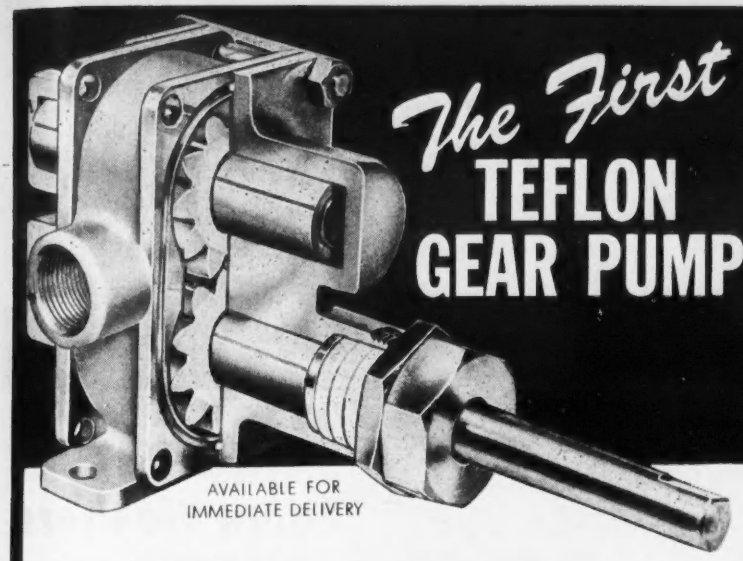


WRITE, ON BUSINESS STATIONERY FOR BULLETIN V-837

TABER PUMP CO.
Est. 1859
291 ELM ST.
BUFFALO 3, N. Y.

TABER

Check 4116 opposite last page



The First TEFLON GEAR PUMP

AVAILABLE FOR IMMEDIATE DELIVERY

FOR NON-LUBRICATING AND CORROSIVE FLUIDS

You asked for it . . .

and Eco is the only manufacturer who has made it available. The first self-priming rotary gear pump suitable for non-lubricating and corrosive fluids is now available for immediate delivery. The pump, with ¾" P.T. inlet and outlet ports, features housings of 316 or Carpenter 20 stainless steel, Hastelloy C or nickel, with reinforced Teflon gears and internal Teflon bearings and packing.

Designated the GearChem*, this pump is suitable for speeds to 1750 rpm at capacities to 10 gpm and pressures to 100 psi. Viscous media to 5000 SSU can be pumped at reduced speeds.

The GearChem created tremendous interest at the recent Chemical Show. In addition to proportioning and metering applications the pump is ideal for general process work in pilot plant and production operations.

Write for prices and complete information.

* T.M. Applied For

Teflon—duPont trademark

ECO

the big name in small pumps

MArket 4-6565

ENGINEERING CO.

12 NEW YORK AVE.

NEWARK, N. J.

Check 4117 opposite last page

MOUNTING GLAND *Eliminated* ON CHEMPRO "wedge-lock"

mechanical seals

The Chempro line of external "wedge-lock" seals does not require a mounting gland, or any modification to the stuffing box, to align and hold the Chempro seal in position. The patented "wedge-lock" design automatically seats the seal stator in the stuffing box in perfect face-to-face alignment with the seal rotor on the shaft. Simple and easy to install—*in only 20-30 minutes.*

OTHER ADVANTAGES

- Completely Interchangeable with Packing
- Simple in Design—Only 8 Parts
- Chempro Teflon* Shaft Packing—Chemically Inert
- External Seals Adjustable After Installation
- Parts Interchangeable Between Seal Styles
- External and Internal Seals Available—From Vacuum to 100 psi

*duPont Trademark

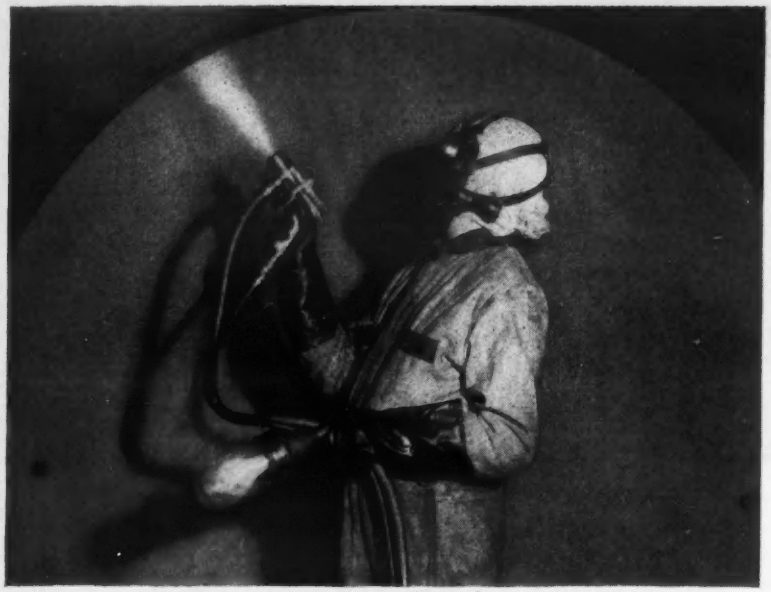
Write for Bulletins CP551 and CP575.

CHEMICAL & POWER PRODUCTS, INC.

The Original Fabricators of Teflon Packings and Gaskets

7 Broadway, New York 4, N. Y.

Check 4118 opposite last page



LITHCOTE PROTECTS INSIDE AND OUT

HERE'S HOW LITHCOTE SOLVES CORROSION AND CONTAMINATION PROBLEMS... AT LESS COST!

This happens to be a railroad tank car . . . being Lithcote lined for the safe transportation of formaldehyde. Your corrosion or contamination problem, however, may not involve such large equipment. But whatever the size or shape, Lithcote can provide the lasting protection you want . . . and do it faster with resulting savings for you. We have been doing it some 22 years now.

Our service is not limited to the application of Lithcote linings. We have the experience and the equipment for applying the many name-brands you want, including AMERCOAT, BISONITE, COLUMBIA #7, COPON, PLASITE, UNICHROME, KEL-F. Tell us your requirements!

NEW FACILITIES...

Conveniently located on the outskirts of Chicago at Melrose Park. Fully equipped for custom coating and lining all shapes and sizes of equipment.

NEW CATALOG...

Far more than a "product" bulletin. Lists actual applications in industry of all kinds. Gives complete data on famous *Lithcote* line.

LITHCOTE CORPORATION
5000 W. Lake St., Melrose Park, Ill. • 42 Belden Ave., Norwalk, Conn.
36 W. 44th St., New York 36, N. Y.

Check 4119 opposite last page

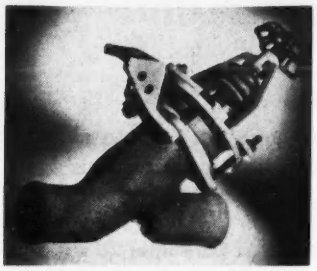
Lightweight glass valve is corrosion-resistant

All parts exposed to fluid are of glass or Teflon

Uses: For processing all acidic metallic salts, various crystalline slurries, and all acids except hydrofluoric and hot concentrated raw phosphoric acids.

Features: Compact, lightweight, tough, valve is corrosion-resistant. All working parts exposed to fluid are of glass or Teflon. Acidic fluids of all concentrations or compositions at temperatures as high as 250°F can be handled.

Description: All-glass, Y-type, two-inch valve weighs nine lb, including mounting bracket. It is less than one foot high, and measures 10 inches from face to face, requiring less than one square foot of space for installation.



Virtually impervious to corrosion, working parts of valve exposed to fluid are glass or Teflon

Valve can be easily mounted in any position through 360°. Flanges can be rotated on valve body for easy alignment with bolt holes of connecting equipment. Made of tempered Pyrex brand borosilicate glass, low thermal expansion allows sudden temperature differential through valve of 200°F. Maximum line pressure at valve is 50 lb psi.

For additional safety, tempered glass valve body is armored with glass fiber-polyester resin sleeve. Armor is designed to carry the same work load as glass valve in case of failure.

(Glass Y-type valve is product of Corning Glass Works, Corning, N. Y.)

Check 4120 opposite last page.

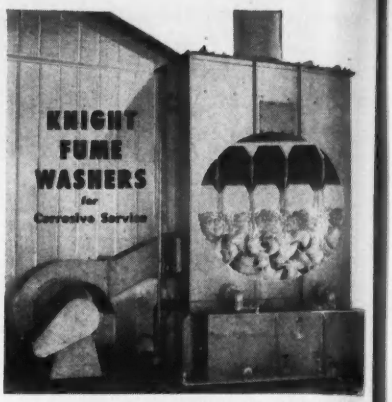


Photo Courtesy Summerill Stainless Tube Div.

KNIGHT Fume Washers — absorb acid fumes and mist; remove dust; cool hot gases

Knight Fume Washers can be built to handle gases or fumes of nearly every character. The one above is removing nitric-hydrofluoric acid fumes which come off pickling tanks that are processing stainless steel tubes. The fumes enter the washer where they are neutralized with a 10% caustic soda solution. Berl Saddle packing, the operating heart of the tower, provides large liquid film areas in the gas stream. This makes for efficient fume washing with relatively small sized equipment.

Knight Fume Washers are designed for many other types of corrosive service, such as absorption of HCl fumes, suppression of oil and acid mists, removal of dust from exhaust gas, elimination of chlorine fumes, and cooling hot gases for processing.

Write today for Knight Bulletin No. 90 on Fume Washers, which gives complete data on their construction and operation. It has tables and graphs showing capacities, pressure drops and horsepower requirements.

Maurice A. Knight
Acid and Alkali-Proof Chemical Equipment
4 Kelly Avenue
Akron 9, Ohio

Check 4121 opposite last page

Rust prevention system

Applications and advantages of manufacturer's rust prevention system are outlined in four-page bulletin. How coatings provide greater durability and elasticity in contact with corrosive elements, and complete specifications of manufacturer's products are covered. Bul BP 4077 — Building Products Div., L. Sonneborn Sons, Inc., 404 Fourth Ave., New York 16, New York.

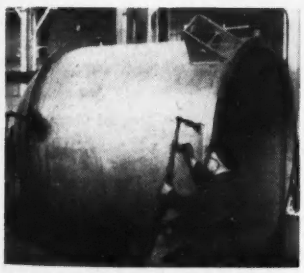
Check 4122 opposite last page.

King-size grease kettle resists corroding by additives

Greases, additives mixed in huge stainless steel pot

Uses: For combining petroleum greases and their additives; in manufacture of soap, oil, and other additives to soap stock, or other like mixtures.

Features: Unit is made of stainless and stainless-clad steel plates.



Giant grease mixer was designed to hold 22,500 pounds of mixture per batch

Description: Giant grease mixer is just under 10′ in height, and will hold 22,500 lb of mixture per batch. The 1½″ side plates of mixer are made of 10% clad stainless, and ⅜″ hemispherically shaped bottom plates have 20% stainless steel clad material over carbon steel. Agitator and paddles are of solid stainless steel.

Mixer has sweep-frame agitator with center paddles in-

To page 170

Here's why saran lined pipe cuts installation costs

It's easy to fabricate, easy to install at job site . . .
and it resists corrosion for years

Here is a corrosion-resistant pipe that can be fabricated in the field. Saran lined pipe can be cut and threaded at the job site with conventional hand tools or power equipment. And, once installed, saran lined piping systems resist corrosion for years . . . offering proved long-range economy.

For piping acids, alkalies, solvents and other corrosive fluids specify saran lined pipe, fittings, valves, and pumps with the new gray lining. This new lining anchored under pressure within the steel casing, enables you to pipe fluids over a wider range of temperatures than ever before . . . with maximum protection from corrosion, plus the strength of steel.

Saran lined pipe, fittings, valves, and pumps are available for systems operating from vacuum to 300 psi, and from well below zero to 200°F.

If your operation can benefit from a *complete* corrosion resistant piping system, write today for more information about saran lined piping components. And be sure to ask about Saraloy® 898 tank lining, too! THE DOW CHEMICAL COMPANY, Midland, Michigan.

SARAN LINED PIPE COMPANY
DEPT. 2001B
2415 BURDETTE AVENUE
FERNDALE 20, MICHIGAN

Please send me information on: ☐ Saran lined pipe, fittings and valves. ☐ Saran lined centrifugal pumps. ☐ Saraloy 898 chemical resistant sheeting.

Name_____ Title_____ Company_____

Address_____ City_____ State_____

YOU CAN DEPEND ON DOW

Check 4123 opposite last page

. . . here's why

CHECK THESE FACTS!

INTEGRITY OF MATERIALS

Farris metallurgy of parts offers as *standard*, stainless steel, rather than carbon steel in critical locations; and use of hardened parts for highest valve operating efficiency.

MINIMIZED SPARE PARTS INVENTORY

Since 1945 every new Farris part has been interchangeable with former parts, keeping inventories at minimum . . . with parts low priced!

NO OBSOLESCENCE OF DESIGN

Construction improvements—not repeated design changes—have resulted in user recognition, standardization of design; eliminating confusion and expense to the customer.

UNEQUALLED QUALITY AT COMPETITIVE PRICES

Freedom from changing inventory, new pattern problems and continuous new tooling permits lowest production costs, passed on to the user in lowest valve costs.

LICENSED TO OTHERS

In the Industry's interest, limited licensing arrangements were granted . . . A Farris patent number is your protection.

PROVEN SAFE PERFORMANCE

The complete dependability of Farris valves has been proven by 13 years of use in the field, under all service conditions.

Farris

Safety Relief Valves

Meets ASME-NB Requirements for ASME Unfired Pressure Vessel Code, Section 8 and ASME Power Boiler Code, Section 1.

Send for the NEW Farris Engineering Catalog. A complete, detailed listing of Farris Process Safety and Relief Valves, plus useful information to help you select the proper valve for your requirements.

Farris®

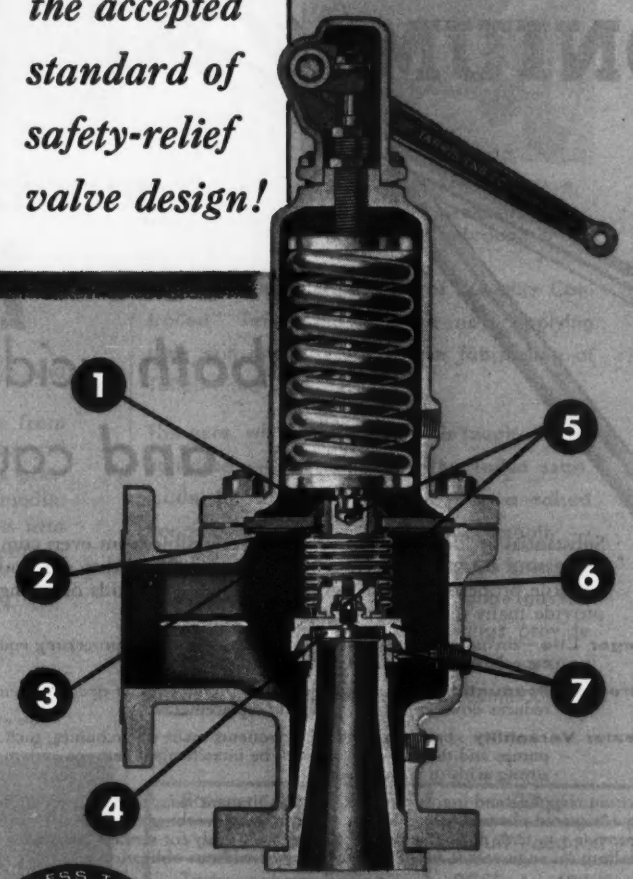
SAFETY-RELIEF VALVES

are your best buy

the accepted standard of safety-relief valve design!

Farris gave industry the ideal concept of a trouble-free, safe, safety-relief valve in 1945... and it has had little need for major design changes through the years. The proven excellence of design and construction has resulted in patent licensing to others, serving to reduce a confusion of designs which retarded the safety valve industry in prior years. Today, the Farris design—with or without its universally accepted optional "BalanSeal" bellows—represents the *standard* of the industry... it has been the standard for over 13 years.

With Farris valves in your process lines you'll know that another confusing design change isn't around the corner to plague you... you'll never worry about obsolescence of your spare parts inventory... you'll always benefit by integrity of materials in valve construction. You can be sure of all this because Farris full-performance valves have proven to be the *accredited leaders* in the field of safety.



1. 2½ to 1 ratio—guide length to guide diameter—prevents galling and hanging up.
2. High thermal expansion rate of sleeve guide and low thermal expansion rate of hardened stem retainer eliminates binding and galling even at elevated temperatures.
3. Sleeve guide provides solid baffle between body and bonnet, shielding spring from ing fluid.
4. Hardened stainless steel optically lapped flat disc—self aligning for maximum tightness.
5. Double universal ball joint from stem to disc for self alignment—eliminates effects of spring, temperature and piping distortion.
6. Stainless steel stress relieved "BALANSEAL"® bellows nullifies effect of back pressure and isolates internal working parts from ing fluid.
7. Cone-shaped disc holder directs flow away from guiding surfaces and forms fixed secondary orifice with single blowdown ring control for built-in capacity.

PROGRESS THROUGH HONEST PURPOSE

Farris ENGINEERING CORP.

505 Commercial Avenue, Palisades Park, N. J.

In Texas: 5405 Clinton Drive, Houston 20

Main Office
Palisades Park, N. J.
Windsor 4-6300

Texas Plant
Orchard 2-7557

affiliates:
FARRIS FLEXIBLE VALVE CORPORATION
FARRIS PICKERING GOVERNOR CO., INC.
FARRIS HYDROTORQUE CORPORATION
FARRIS HYDROSEAL CORPORATION

For more information on product at left, specify 4124 see information request blank opposite last page.

ZR

CORROSION RATE
Less than .0002 inches per year in *boiling, concentrated* hydrochloric acid.

World's First Commercial Zirconium Thermowell — another ZR "First" by The CARBORUNDUM METALS Company.

ZIRCONIUM

. . . guards against **corrosion attack** by ***both*** acids ***and*** caustics

Substantial production savings are now possible from even common items of chemical processing equipment such as thermowells...when they are made of zirconium. The versatile properties of zirconium shrug off strong acids or strong alkalis with equal ease and provide many operational economies:

Longer Life—zirconium's super resistance to corrosion means processing equipment with service life expectancy as high as *twenty years.*

Increased Production—zirconium equipment permits higher operating temperatures and considerably reduces down-time for repairs and replacements.

Greater Versatility—basic equipment components made of zirconium, such as valves, tanks, filter presses, pumps and thermowells can now be interchanged between systems for service in either strong acids or strong alkalis.

Zirconium sponge and ingots are available for shipment *today* in volume quantities from CARBORUNDUM METALS' fully integrated plants. Leading zirconium fabricators working closely with CARBORUNDUM METALS are geared to provide you with finished zirconium products...ready for service. Assistance from our staff of metallurgical engineers is available upon request without obligation.

WRITE The CARBORUNDUM METALS Co., Department C-91-79A, Akron, New York today for latest zirconium price lists and technical data. Ask to be placed on the mailing list of "More ZR Facts," the zirconium industry's first continuing source of technical information.

VISIT OUR EXHIBIT at the ATOM FAIR and NUCLEAR CONGRESS . . . Chicago International Amphitheater, March 17-21

The CARBORUNDUM METALS Company
Akron, New York, U.S.A.
Division of THE CARBORUNDUM COMPANY

Production Pioneer of ZIRCONIUM

H 91-79A

Check 4125 opposite last page

From page 167

dependently driven by constant torque driven motors located on top of kettle. Mixer is designed to receive bottom radial propeller driven motor which will also give constant torque.

Agitator and paddles for huge grease mixing pot are of solid stainless steel

Design of radial propeller combines advantages of marine-type propeller and turbine-type agitator. High peripheral speed of the blades gives excellent mixing and shearing of the grease.

(Stainless steel plates were supplied by Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.)

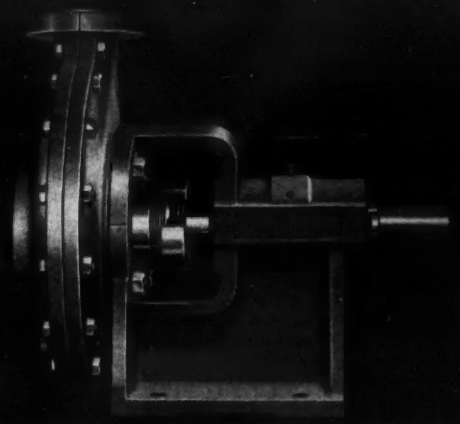
Check 4126 opposite last page.

(Giant grease mixer was constructed by Struthers Wells Corporation, 1003 Pennsylvania Ave. West, Warren, Pa.)

Check 4127 opposite last page.

"It's sure to be a splendid, sure-fire, world-shaking discovery — but of course we won't know until we test market it."

AMPCO®
ELASTOMER-LINED CENTRIFUGAL PUMPS



THE ONE ECONOMICAL, SAFE, DURABLE PUMP THAT
HANDLES HCl

Eight sizes *in stock* — linings of natural rubber, Neoprene, and Hypalon. See your nearby Ampco Pump Distributor.

Saves you the extra expense of a special pump made from costly or dangerously fragile alloys — to handle muriatic acid — HCl, bleaching agents, mixed acids, cleaning solutions, plating solutions, abrasive slurries, and other destructive media.

Will not affect taste or color, nor introduce impurities into the material being pumped. Resists damage by stray currents in plating baths and from galvanic effects.

Capacities — heads range to 400 GPM and 100' TDH.

Write for free Bulletin P-6.

AMPCO METAL, INC.

Dept. CP-3, Milwaukee 46, Wisconsin • West Coast Plant: Burbank, California

P-34

AMPCO®
SPECIAL ALLOY AND NON-METALLIC CENTRIFUGAL PUMPS

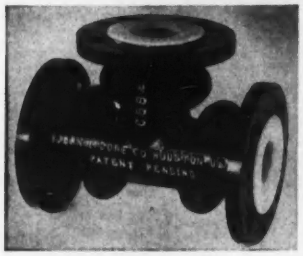
Always depend on AMPCO when pumping corrosive media

Check 4128 opposite last page

NOW FROM DORE'

TEFLON† LINED PIPE AND FITTINGS!

If you are handling corrosives or require contamination-proof piping — you need Dore' Teflon Lined Piping and Fittings.

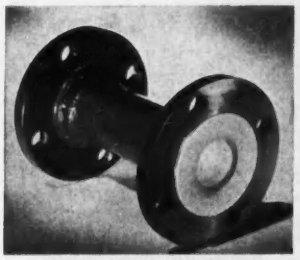


TEFLON LINED TEES * * have a solid, weldless liner. Sizes 1" through 6".

TEFLON LINED ELLS * * are available in sizes 1" through 6".

Dore', the leading molders of "Quality Controlled" Teflon Shapes, are now applying their skill and integrity to the fabrication of Teflon lined pipe and fittings.

The pure, white* Teflon lining is tough, dense, hole-free — has no welds. The Teflon seals, made by forming the liner over a raised flange face, is perfectly flat and smooth — not wavy. It covers the entire raised face and eliminates the use of an extra flange gasket. Dore' Teflon lined pipe and fittings provide corrosion-free, contamination-proof piping for an extremely wide range of commodities.



TEFLON LINED PIPE is available in sizes 1" through 6" — lengths to 10' with welded flanges.

The Teflon seal lies flat, and smooth on the raised flange face. No extra gasket is needed for a perfect, protective seal.

Pressure Rating	400 psi
Vacuum Rating	Full Vacuum
Temperature Rating	−90°F. to 400°F.

†DuPont Tetrafluoroethylene Resin. *Only virgin Teflon is white. **Patent Pending.

John L. Dore', Co.

SALES AGENTS IN U.S.A. FOR JOHN L. DORE, INC.
Du Pont's Teflon • Hi-Quality Nylon

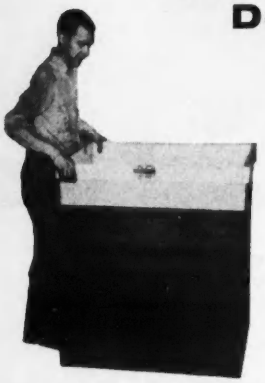
5406 SCHULER • P. O. BOX 7772 • HOUSTON 7, TEXAS

Check 4129 opposite last page

Corrosion Resistant AGILENE* And AGILIDE** Tanks And Liners...

All welded AGILIDE acid mixing tank. 3'x3'x8'

Save Thousands of Dollars...



This custom made removable tank liner is 3' x 3' x 3' and was built with a 4" deep overlap flange to completely protect the steel tank against corrosion.

Fabricated to specifications, Agilene and Agilide tanks cut downtime and replacement costs because they are impervious to most pickling and plating solutions, oxidizing acids, alkalies and salt solutions. They resist wear and abrasion and are non-toxic and non-contaminating.

- Chemical Resistant
- High Strength and Hardness
- Excellent Thermal and Electrical Insulation

Stop corrosion from eating your profits. Check with us on your requirements today and save money.

Write for detailed literature

**Agilene — Polyethylene*
***Agilide — Rigid PVC*

AGILENE AGILIDE

American Agile Corp.
5461 Dunham Road
Maple Heights, Ohio

Check 4130 opposite last page

Corrosion meter provides a direct reading of corrosion in micro-inches or mils. Exposed sample need not be removed from solution and continuous determinations are possible

In the battle against corrosion, Monsanto Chemical Co., is constantly testing materials to determine corrosion rates. Standard of comparison is enhanced and accuracy improved as . . .

corrosion meter slashes time for corrosion-rate determinations

THEODORE W. WETT
Assistant Editor

Problem: Loss-in-weight method of determining corrosion rates is reasonably accurate but slow, and at times cumbersome. At Monsanto Chemical Co., Everett, Mass., materials are continuously evaluated to assure that best ones are being used in constant fight against corrosion. Samples were evaluated in a boiling solution of one of the more corrosive chemicals used in plant operations. After various exposures, sample was cleaned and weighed to determine loss of base metal to corrosive action of chemical.

This system provided reasonably accurate results, although in some cases base metal would be removed in cleaning. This resulted in an estimated corrosion rate that was too high. If the sample was not cleaned properly, estimated rate was too low. Some corrosion products made proper cleaning of samples extremely difficult.

Since samples did have to be cleaned after each predetermined exposure period, a continuous determination of corrosion rate could only be obtained as a series of separate determinations. The results of this method did not in every instance agree with what actually happened in service.

Solution: Monsanto evaluated and began to use a corrosion meter in November 1956 for corrosion-rate determinations. Meter utilizes a method for

measuring corrosion which involves following progress of corrosion electrically.

A probe of metal to be

Testing Methods

tested is immersed in corrosive solution. Probe is part of an electrical circuit used to make resistance measurements. Since electrical conductivity of non-metal as compared to metal is negligible, as metal is corroded resistance increases. Instrument measures this resistance by means of a Kelvin bridge circuit. Readings are made insenitive to temperature by making a second arm of bridge circuit of same metal as that exposed, locating it close to exposed element and protecting it to maintain constant cross section.

Circuit is so constructed that ratio of resistance of corroding element to that of non-corroding element is translated directly into micro-inches or mils of metal lost. Corrosion rate may then be easily determined.

Technique Learned in ½ Hr

Results: By using meter, Monsanto has obtained results that closely correlate with loss-in-weight measurements but with distinct, advantageous differences. Results are obtained five to ten times faster and more precisely. Technique is simple and can be learned by anyone in less than half an hour. Instrument permits continuous monitoring of corrosion at various stages without removing material from system for cleaning and measurement. This also eliminates errors due to loss of base metal in cleaning or insufficient removal of deposits.

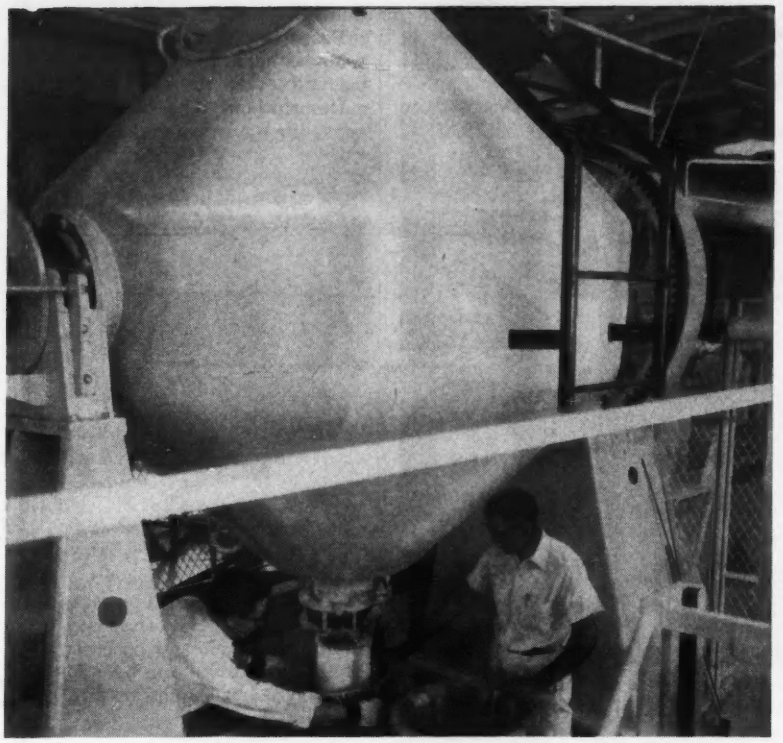
Although there is no "absolute" corrosion rate obtained for a system as a whole, actually in service, such a determination is not practicable in any case. It provides an excellent standard for comparison of corrosion data for a number of materials, quickly and accurately.

(For more information on Corrosometer check 4131 opposite last page.)

Corrosioneering News

Quick facts about the services and equipment available to help you reduce corrosion and processing costs.

Published by The Pfaudler Co., a division of Pfaudler Permutit Inc., Rochester, N.Y., U.S.A.



Now Upjohn saves 32 hours drying 2500 pounds of Orinase

Sixteen hours are all it takes for the Upjohn Company to dry and blend 2500 pounds of Orinase in the Pfaudler conical dryer-blender.

It used to take forty-eight hours to dry that much of Upjohn's oral antidiabetic in two straight vacuum dryers.

Upjohn says it also saves eight hours a week in materials handling time with the new dryer.

Since it's a pharmaceutical, the product poses a purity problem which is nullified by the noncontaminating glassed-steel construction of Pfaudler dryer-blenders.

Other companies, many handling corrosives, report similar savings, some of them cutting drying time by as much as 90%. The smooth glassed surfaces of the drying chamber are insensitive to all corrosives except hydrofluoric acid and hot alkalies above pH 12.

The Pfaudler design offers a solid, one-piece drying chamber which offers maximum strength and drying area unbroken by joints or clamps. The vacuum exhaust tube is centrally located for the most efficient vapor removal.

There's much more about the Pfaudler dryer-blender that proves its efficiency of operation over other designs . . . all of it in Data Sheet 26 which you'll find offered in the coupon.

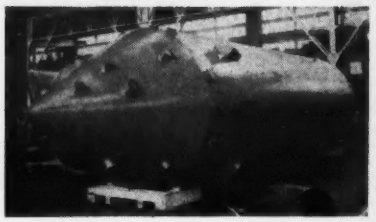
Corrosion resistance of glassed steel unimpaired by gamma radiation

No adverse effects could be detected from the exposure of Pfaudler glassed steel to 10^{10} roentgen of gamma radiation. Tests were recently completed by Pfaudler in cooperation with Oak Ridge National Laboratory and other installations.

Glassed steel is being considered for chemical processing involving nuclear energy wherever corrosive conditions are particularly severe and ease of decontamination is important.

Probable uses of glassed steel in this field include storage of acids and other materials which may or may not be radioactive, storage and disposal of radioactive wastes, and chemical processing of highly radioactive and corrosive materials.

A larger test program is now under way to follow up the preliminary results and to determine even more conclusively the effect of radiation on glassed metals.



"Is Pfaudler making Sputniks?"—This was an oft heard question recently from visitors to our Rochester plant. What they saw was this unusual new cone bottom reactor we fabricated and glassed for a leading chemical producer. All those nozzle openings on the conical surface made glassing a little "touchy," so it took us a little longer than with standard models. The vessel is 388 inches long with a 138-inch OD, and will be used for storing and purging polymer chips at 160°F. An internal column does the purging with an inert gas.

Why do we show it here? To suggest that we can put the corrosion resistance of Pfaudler glass to work on more than conventional reactors, storage tanks, columns, etc.

THE PFAUDLER CO.
a division of PFAUDLER PERMUTIT INC.
Dept. CP-38, Rochester 3, N.Y.

Please send information on: ☐ Conical Dryer-Blenders ☐ Pfaudler Buyer's Guide.

Name.....

Title.....

Company.....

Address.....

City..... Zone..... State.....

Check 4132 opposite last page

for heavy duty
CORROSION PROTECTION

PHENOLINE 305

PHENOLINE 305

- 85% solids content
- Needs only 2 coats (12 mils)
- Gives 2-3 times longer life, eliminates 1-2 recoating cycles
- Costs less to apply
- Can be brushed or sprayed

Phenoline 305 forms a tough, non-porous maintenance coating that protects against the corrosive effects of most acids, alkalies and solvents. It gives effective, economical protection to equipment exteriors, structural steel, concrete floors and walls, and pump bases. Also used as a deck coating.

Here's rugged, heavy-duty, long-lasting maintenance protection against severe corrosive conditions. And because fewer coats give greater thickness, Phenoline 305 actually costs less than many so-called "cheaper" protective coatings. Use CARBOLINE's ENGINEERING APPROACH — compare cost per sq. ft. per year of service.

Write today for Bulletin 600 with complete information on this superior heavy-duty corrosion protection — Phenoline 305.

carboline COMPANY

32-8 Hanley Industrial Ct.
St. Louis 17, Mo.

Manufacturers of
PHENOLINE, POLYCLAD,
RUSTBOND PRIMERS

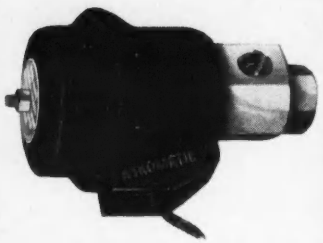
Check 4133 opposite last page

Stainless solenoid valve rated at 6000 psi

Uses: For control of high-pressure corrosive gases and fluids.

Features: Stainless steel solenoid valve is rated at 6000 psi.

Description: Designed for use with any media, two-way stainless steel solenoid valve is direct-lift type machined from 316 Stainless Steel bar-stock. Valve is available in



Two-way stainless steel solenoid valve is rated to 6000 psi

⅛, ¼, ⅜, and ½" pipe sizes. Port sizes depend on maximum pressures and viscosity of media. Valve can be supplied with an explosion-proof housing if desired.

("Series 2000" stainless steel solenoid valve is available from Atkomatic Valve Co., Inc., 545 W. Abbott St., Indianapolis 25, Ind.)

Check 4134 opposite last page.

Interlocked armored cable resists chemical action, easy to install

Protective metallic covering eliminates use of conduit

Uses: For power and lighting, motor control, or overhead circuits.

Features: Product has high resistance to harmful chemical action, and is easy to install and maintain. Because of its protective metallic covering, cable may be used without conduit.

Description: Interlocked armored cable is available in 600-, 5000-, and 15,000-volt ratings, with galvanized steel, aluminum, or bronze covering. Compared with cable-in-con-

TUFF-TUBE
Laminated Fiberglass-Epoxy

Designer's check list for CHEMICAL PIPE and TUBING

✓ CORROSION
TUFF-TUBE, a reinforced fiberglass-epoxy laminate, is the most effective plastic material available to fight corrosion in the chemical, petrochemical and food processing industries. It will resist thousands of highly corrosive chemicals, both acid and alkali.

✓ TEMPERATURE
TUFF-TUBE is a rigid material that will withstand temperatures up to 400°F, including severe thermal shocks.

✓ INSTALLATION
TUFF-TUBE is one-sixth the weight of steel, with a higher strength/weight ratio. Tensile strength 35,000 psi. It is easily handled and requires no maintenance after installation.

✓ PERFORMANCE
TUFF-TUBE's concentricity and smooth inner walls insure unobstructed, fast moving flow. It provides excellent thermal and electrical insulation. Electrolysis problems are eliminated.

✓ SAFETY
TUFF-TUBE is non-magnetic, non-sparking. Non-toxic, safe for use with all media.

✓ SIZES
TUFF-TUBE is available in standard lengths to 10 ft. Tubing diameters as small as 1/16 in. Pipe sizes up to 4 in. Wide range of wall thicknesses.

✓ COST
TUFF-TUBE is more economical three ways — original purchase, easy installation, minimum maintenance.

LAMTEX
INDUSTRIES, INC.
51 STATE STREET • WESTBURY, NEW YORK

Check 4135 opposite last page

Ashes, coal and other substances under foot often make solid floors in boiler rooms unsafe.

Such hazardous materials cannot accumulate on a floor made of Irving open steel grating. Debris falls right through, making floors always clean. Dangerous fumes can escape through open grating. Floors made of Irving Grating are clean, safe at all times . . . no ankle turning, tripping, slipping, hot foots. It is fireproof, self-ventilating.

Manufacturers of Riveted, Pressure-Locked, and Welded Gratings of Steel, Aluminum and other metals.

"A FITTING GRATING FOR EVERY PURPOSE"

IRVICO

IRVING SUBWAY GRATING CO., Inc.
Originators of the Grating Industry

Offices and Plants at
5050 27th St., LONG ISLAND CITY 1, N. Y.
1850 10th St., OAKLAND 23, CALIFORNIA

Check 4136 opposite last page

duit, interlocked armored cable requires less space and is easier and faster to install because of its flexibility.

Troughs, racks, or ladders are used instead of conduit. This open system affords greater versatility and more efficient maintenance. Internal

Because of its protective metallic covering, interlocked armored cable may be used without conduit

wiring rearrangement or additional power facilities may be added without major building alterations. System may be installed vertically or horizontally as required.

(Interlocked armored cable is product of Rome Cable Corporation, Rome, N.Y.)

Check 4137 opposite last page.

Positive sealing against solvents, corrosives

Uses: For sealing in presence of, and in contact with, active solvents and corrosives.

Features: Body of unit is entirely of Teflon, and is encased in stainless steel or other corrosion-resistant alloy. Unit is assembled so that all components are in absolute concentricity. This permits maximum sealability with minimum lip wear.

Description: Seal incorporates correct amount of flexibility for maximum sealing effect. When installed, an effective seal is formed initially by interference fit of the lip. In service, wear progresses to a point of equilibrium where it practically ceases, and seal continues to serve effectively.

(Chempac Teflon Clipper seal is product of Johns-Manville Corporation, 22 East 40th St., New York 16, N.Y.)

Check 4138 opposite last page.

MAKE ORDINARY EQUIPMENT CORROSION PROOF

KEL-F* LAMINATE offers a way to make any equipment and piping extremely resistant to acids, alkalies, oxidants, and solvents at temperatures up to 350°F—and at reasonable cost.

It is readily cemented over any contour and to any material of construction—metal, wood, concrete, etc. Also, KEL-F, being a thermoplastic resin, seams may be heat-fused into a continuous, chemically impregnable lining which is durable, shatterproof and abrasion resistant.

KEL-F Laminate, Garlock Style No. 9574, is available for installation by certified applicators, trained and equipped to assure best results.

For prompt service, contact one of The Garlock Packing Company's 30 sales offices and warehouses in the U.S. and Canada, or write for Bulletin AD-152.

**Minn. Mining & Mfg. Co. Trademark*

UNITED STATES GASKET COMPANY
Camden 1, New Jersey

USG United States Gasket — *Plastics Division of* GARLOCK

Check 4139 opposite last page

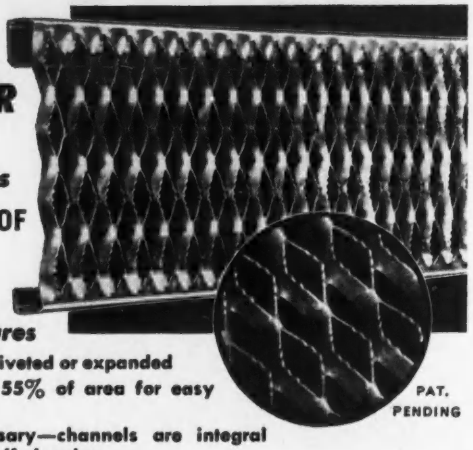
two superior open steel
FLOOR GRATINGS
BY GLOBE

1 Safety GRIP-STRUT®

FOR MAXIMUM SAFETY ALL OVER YOUR PLANT

Important Safety Features

★ FIRE PROOF ★ SLIP PROOF
★ MAXIMUM STRENGTH
★ MINIMUM WEIGHT



Important Economy Features

★ All one piece, not welded, riveted or expanded
★ Open space in excess of 55% of area for easy access of light and air
★ No extra supports necessary—channels are integral part of the material. ★ Self cleaning
★ Cut and installed like lumber by your own maintenance force. ★ Low in original cost. ★ For balconies, no secondary sprinkler heads needed

PAT. PENDING

Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

2 GOLD NUGGET® WELDED grating
PAT. PENDING

The QUALITY GRATING for Heavy Duty Applications

★ 3/16" projection weld nugget for greater rigidity and strength
★ Vertical alignment of the main load bar assured
★ All bars are load carrying bars including secondary bars
★ Anti-skid pattern

PROJECTION WELD
Each secondary load bar (A), as projected welded to the primary load bar (B) has a shear strength of 5,000 pounds per weld. There are 28 such projection welds to a square foot of grating. This means that GOLD NUGGET Welded Grating can sustain greater shock loads than other gratings.

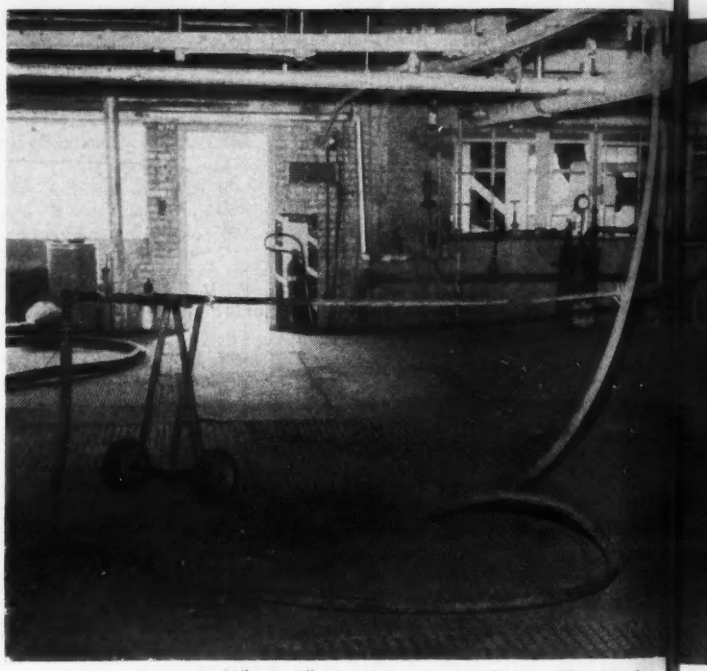
For the complete details of these revolutionary new gratings, write for new catalogs today. Distributors in all principal cities. Consult the yellow pages in your phone book under "GRATING".

108

PRODUCTS DIVISION
The GLOBE Company
MANUFACTURERS SINCE 1914
4006 SOUTH PRINCETON AVENUE • CHICAGO 9, ILLINOIS

Check 4140 opposite last page

Monsanto has had an outstanding safety operation for many years. Constant emphasis is being placed on both this safety record and work simplification. Both causes were advanced when air-line hoses were connected by a . . .



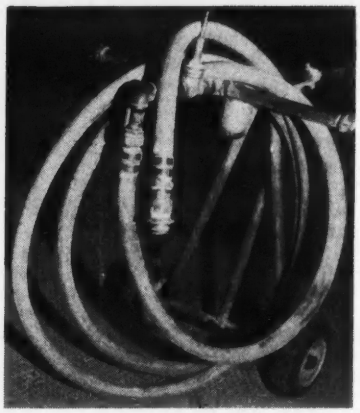
▲ Where will you store an ungainly item like this if hose is permanently connected? Couplings used at Monsanto mean it can be out of way in seconds

THEODORE W. WETT
Assistant Editor

Problem: Safety minded management at Monsanto Chemical Co., Everett, Mass., recognized a hazardous situation in method being used to connect rotary cutters to compressed air lines. Air was used to drive air motors which operated two cutter units for scraping walls of vessel of small diameter and 18′ long. Long hoses needed to connect air motor to air line, sufficient to reach a number of vessels and permit flexible handling of 18′ scraper, were a constant tripping hazard. This situation was particularly dangerous when unit was not in use since connections to air line were permanent, and unwieldy scrapers prevented coiling of hoses. They had to be draped across the floor.

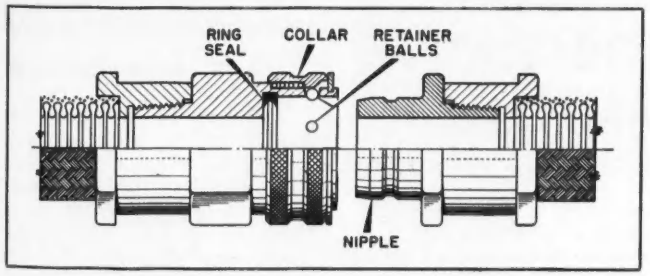
Solution: Six outlets from air supply line were installed recently. Each outlet and hose was equipped with a Quick-Seal coupling. Heart of steel coupling is sealing ring with a circumferential "V" opening. Pressure inside line expands opening, making seal tighter with increase of pressure. Coupling nipple seats against side of ring so that

quick-connect coupling that ended draped hose hazard



▲ Hose can be coiled and moved out of the way in seconds. Tripping hazard is eliminated

▼ Coupling can be connected and disconnected in seconds. Nipple butt seals on seal ring to provide quick positive seal



seal is made instantaneously, and is leak tight. This butt seal prevents excessive wear. If ring does become worn, it is replaced using a long-nose pliers as only tool.

Results: Hose is hooked up to each coupling in a matter of seconds, and disconnected just as quickly when not needed. When cutter is not in use, hose can be coiled up and both hose and cutter moved out of way. Shorter hoses can be used since air supply is now located closer to each area of operation. This cuts down on possible tripping hazard during actual cleaning work on the vessels. Operation is safer and more efficient.

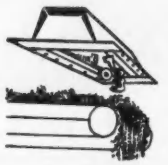
(For more information on Quick-Seal couplings check 4141 opposite last page.)

"Somebody" in this man's plant neglected to guard against tramp iron damage to men, materials and machinery. Maybe he thought a spark-induced explosion was a 100 to 1 chance . . . and the whole plant went up in smoke! Maybe he thought a little iron in the material was unimportant . . . and a contaminated product ruined his company's reputation for product purity! Maybe he thought tramp iron wouldn't damage machinery . . . and repairs and down time ate up a big chunk of profit!

Obviously, that "Somebody" goofed. *He didn't remember that Dings offers a complete line of magnetic separators and metal detectors to safeguard personnel, plants and products from tramp iron damage.*

SOMEBODY COULD HAVE PREVENTED TRAMP IRON TROUBLE WITH THESE

DINGS MAGNETIC PROTECTION PRODUCTS

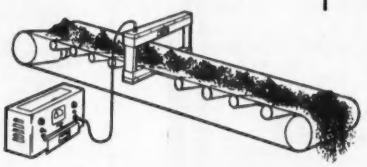


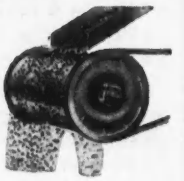
PERMA-PLATE MAGNETS — the most versatile, simplest, and least expensive magnetic separators available for easy installation in chutes, ducts, slides, and over conveyor belts.

SELF-CLEANING RECTANGULAR MAGNETS — equipped with an endless-belt that sweeps iron from the magnet face. Ideal for pulling large quantities of iron from deep burdens on high-speed belts.

METAL DETECTORS — automatically signal the presence of metal in solid, bulk or packaged materials. Available in magnetic or electronic models.

PERMA-DRUMS—assure fully automatic, low-cost iron removal where other type separators may be impractical . . . below apron feeders, chutes, spouts, or in processing machines.





WHICH "SOMEBODY" ARE YOU?

With the Dings complete line to choose from . . . Dings engineering service to help you make the most efficient and economical selection . . . Dings 55 years of experience in solving tramp iron problems like yours — *you* can be the "Somebody" in your plant who increases production and reduces costs! Write us for the solution to your tramp iron problems today.

DINGS MAGNETIC SEPARATOR CO.

Dings

4731 W. Electric Ave.
Milwaukee 46, Wis.

ML-357-3/3

Check 4142 opposite last page

New!

PROTECTION + COMFORT *THE ALL-NEW WIL-GARD SOFT-LINED LATEX GLOVE*

Real comfort in an acid-resistant natural latex glove! This Wil-Gard has a soft, cotton fiber lining that reduces hand perspiration . . . permits fast, easy on-and-off . . . yet provides maximum flexibility and sensitivity. Curved fingers prevent binding . . . turn-down cuffs trap running liquids . . . thousands of tiny gripping surfaces provide a surer, safer grip. Write for specifications.

WIL-GARD

NOW 6 QUALITY LINES . . . 1 DEPENDABLE SOURCE

COMPAR PLASTIC	BUNA-N
NATURAL RUBBER	SOFT-LINED NATURAL LATEX
NEOPRENE	UNLINED NATURAL LATEX

Sold only through Distributors

WR-158-18B

PROTECTION FOR THE HANDS OF INDUSTRY • SINCE 1916 ®

WIL-GARD

THE WILSON RUBBER COMPANY • INDUSTRIAL DIVISION • CANTON 6, OHIO
A Division of Becton, Dickinson and Company

Check 4143 opposite last page

King MANOMETERS

Every Size – for Every Service

U-Type Manometers

- Single Cleanout
- Single Gland-Packed
- Double Cleanout
- Double Gland-Packed
- High Pressure

Low in price, Trouble-free, Easy to install and read

Well-Type Manometers

- Low Well
- Raised Well
- Barometric Reading

Stay clean longer, Easy to service

Multi-Tube Manometers

- Multi-Well
- Common-Well
- Special-Purpose

FREE LITERATURE gives sizes, construction and prices. Write today! And ask for informative 12-page Manual on Manometers.

KING ENGINEERING PRODUCTS include King-Gages — Manometers — Self-Closing Push Valves — Pressure Transmitters — Sight Feed Bubblers — Overflow Check Valves — Air-flow Snubbers — Sediment Traps — Moisture Indicators

KING ENGINEERING CORP.
Box 270 • Ann Arbor, Mich.
REPRESENTATIVES IN PRINCIPAL CITIES

Check 4144 opposite last page

PISTON PACKING PROBLEMS SIMPLIFIED!

Conventional and 45° bevel type Pumcups.

• The *right* piston packing for reciprocating pumps and cylinders goes a long way toward eliminating the problems of slippage, maintenance and down-time.

Because Darcova Pumcups are made in a complete range of sizes, various types, and in many texture-engineered compositions, they *fit* your temperature-pressure-fluid conditions. That's one important reason why they usually outlast other packing at least 3 to 1 while holding top efficiency to the last!

Why not get *all* the facts? Send today for Bulletin No. 5503.

DARLING VALVE & MANUFACTURING CO.
Williamsport 4, Pa.

DARCOVA

TRADE MARK

PUMCUPS

Check 4145 opposite last page

SAFETY

Fire extinguishers have improved discharge

Recently designed nozzle puts out fires faster

Uses: For carbon dioxide fire fighting.

Features: Recently developed design of discharge device on fire extinguishers allows fires to be put out more quickly. Much of the punishment an operator takes in putting out a fire with a conventional CO_2 extinguisher is eliminated.

Description: Nozzle is built with five orifice holes. Usual opening in center of nozzle discharges parallel with taper of horn. Other four openings are placed around the nozzle, 90° apart. Discharge from these four is at right angles to the horn. This placement enables the snow to break into minute particles, giving almost instant change from snow to gas.

(Fire extinguishers with new nozzles are product of American LaFrance Corp., Elmira, New York.)

Check 4146 opposite last page.

Improved drum faucet closes automatically, prevents leakage

Uses: For dispensing liquids from drums.

Features: Sturdy spring located within body of unit maintains liquid-tight closure at all times. Hand pressure on large lever-type handle is necessary to push spring back and permit flow of liquid. No seepage or leakage is possible when hand pressure is removed. Valve closes automatically.

Description: Valve of drum faucet is placed at insertion end where it cannot be distorted by excessive wrench pressure. A Kel-F or Teflon O-ring gasket is used to withstand destructive action of chemicals. O-ring construction uses positive wedging seat action which forms a tight seal, and avoids any gasket leakage due to swelling, shrinking,

CORROSION YOUR BIG PROBLEM?

New 60-page booklet gives complete facts on

REPUBLIC ELECTRUNITE®
STAINLESS STEEL TUBING & PIPE

- ANALYSES
- APPLICATIONS
- SPECIFICATIONS
- ENGINEERING DATA

Write for Booklet STP-1

Protect your electrical wiring in highly corrosive locations with Republic "Dekoron®-Coated" E.M.T. Booklet DEK-3 tells how. Write for it.

REPUBLIC STEEL
STEEL AND TUBES DIVISION
207 East 131st Street • Cleveland 8, Ohio

Check 4147 opposite last page

PUMP LIQUIDS GASES SLURRIES

WITHOUT CONTAMINATION OR CORROSION

Wavelike Motion of Steel Fingers Forces Material Through Tubing

Write for Descriptive Literature

Cap. 0.2 cc. per min. to 4.5 G.P.M.
Prices $60.00 to $550.00
depending on size and accessories

SIGMAMOTOR, INC.
18 North Main St. • Middleport, N.Y.

Check 4148 opposite last page

cracking, or other deterioration.

Two types are available: a self-positioning swivel-type faucet which may be screwed tightly into drum opening and the spout portion, regardless of position, then swiveled to correct angle for dispensing where it is secured by a knurled locking ring; and, the usual rigid-type faucet which generally requires a thread compound to form a liquid-tight connection.

Body of faucet may be of non-sparking brass or stainless steel. Lever-type push handle is a cadmium-plated steel stamping. A cylindrical, perforated, brass fire baffle, which also serves as strainer, is located within the faucet at dispensing end. It is easily removed for cleaning without unscrewing faucet.

(Drum faucet is manufactured by Protectoseal Company, 1920 South Western Ave., Chicago 8, Illinois.)

Check 4149 opposite last page.

Explosion-proof motors have highly efficient cooling system

For atmospheres containing hazardous solvents

Uses: For atmospheres containing gasoline, petroleum, naphtha, alcohol, acetone, and natural gas. Can also be used for explosive dusts such as coal or finely divided metal.

Features: Motors have efficient cooling systems. On fan-cooled unit, trapped clean air within motor enclosure is transferred by rotor action to the large frame and bearing-arm surfaces. Cooling air stream, supplied by external aluminum fan, is directed by a fan shield over the motor surface to dissipate this heat. Air stream is confined close to surface of the motor to eliminate hot spots and prevent accumulation of dust and dirt. Non-ventilated motor is cooled by convection and radiation.

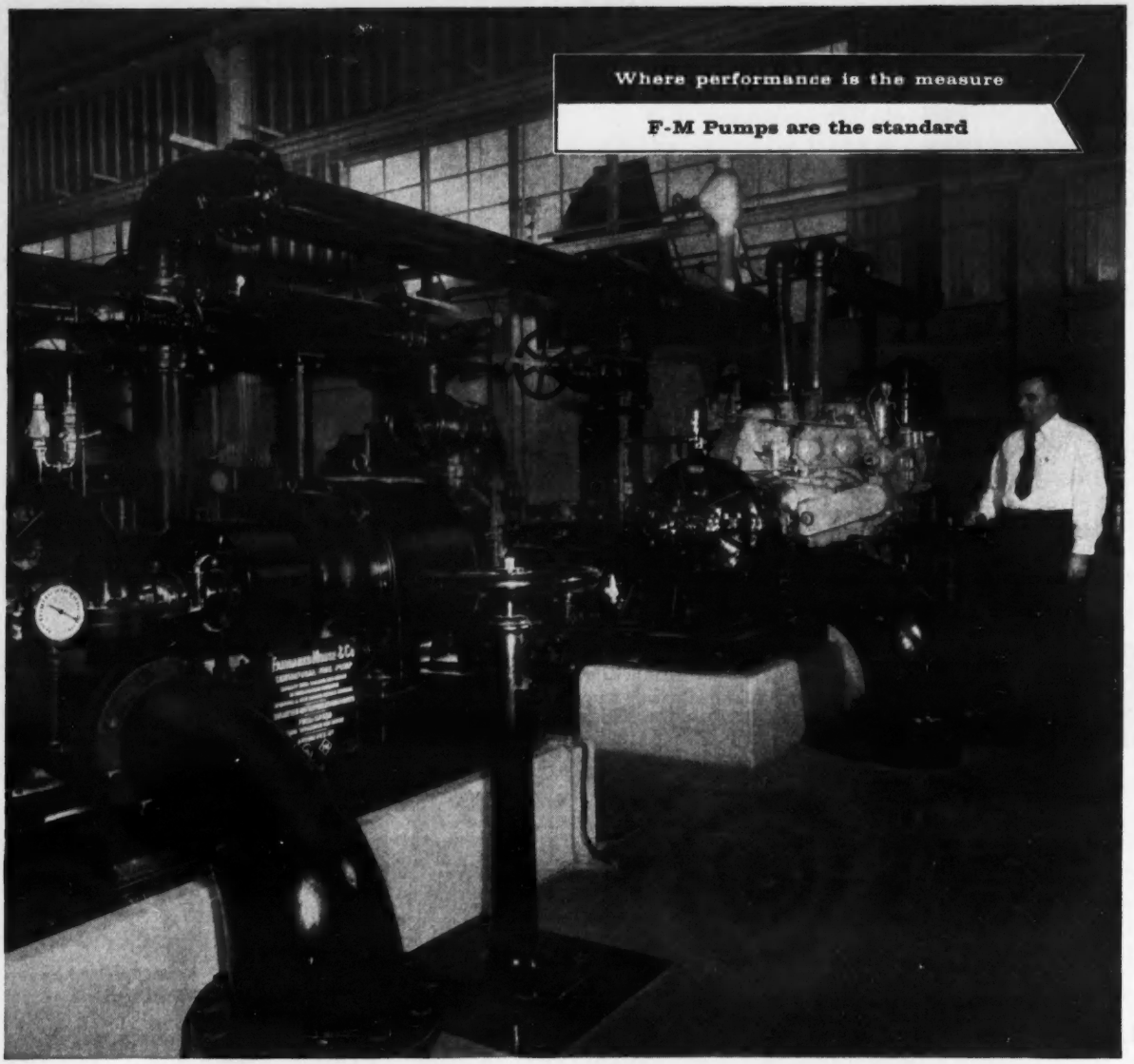
Description: Totally enclosed explosion-proof motors

Why Is RIDGID The World's Most Popular Pipe Wrench

...because it was a better pipe wrench when first created 35 years ago, and nearly every year since it has been improved . . . in performance, design, materials, so it is still the most for your money. Buy RIDGID at your Supply House.

The Ridge Tool Company, Elyria, Ohio, U.S.A.

Check 4150 opposite last page



Mr. George Biggar, plant engineer of Ford Motor Company assembly plant at Mahwah, N. J., checks Fairbanks-Morse fire pumps (1500 gpm. motor-driven pump in foreground, 2500 gpm. diesel-driven pump near Mr. Biggar).

Ford guards against fire at giant new plant

To protect one of the world's largest auto assembly plants against fire, Ford Motor Company depends on these two Fairbanks-Morse fire pumps. As the heart of an extensive system, the two F-M pumps provide defense in depth, one pump backstopping the other.

This installation is typical of the great care and planning by modern industry to prevent the catastrophe of fire. Call in your F-M Sales Engineer for expert assistance in pump specification. As builder of the world's greatest variety of hydraulic combinations, Fairbanks-Morse will provide the exact type, exact size pump you need for maximum dependability.

For information write Fairbanks, Morse & Co., Dept. CP-3, 600 S. Michigan Ave., Chicago 5, Ill.
Ask for F-M Fire Pump Bulletins 5814F (horizontal) and 6920F (vertical).

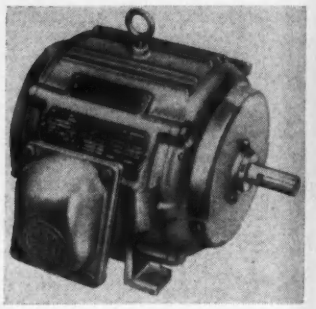
FAIRBANKS-MORSE
a name worth remembering when you want the BEST

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MAGNETOS

Check 4151 opposite last page

are offered in both fan-cooled and non-ventilated models. They bear Underwriters' Laboratories approval for use under hazardous conditions.

One improvement in design is a conduit box which can be rotated around the motor periphery to any of four posi-



Motor for chemical uses

tions, 90° apart. Large grease reservoirs can be flushed and refilled from motor surface.

(Models KZCX (ventilated) and Model KCEX (non- ventilated) explosion-proof motors are product of Fairbanks-Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.)

Check 4152 opposite last page.

Concentrated chemicals handled safely with feeder

Provides pumping directly from shipping containers

Uses: For transferring acids, metal-treating compounds, plating solutions, and other corrosives from shipping containers.

Features: Unit is designed to provide complete safety to operator. It is compact and easy to install.

Description: Materials of construction permit feeder to handle most corrosives. Pumping rates, from 0.8 to 8.0 gal per 24-hr period, can be adjusted. Feeder is furnished as a complete package.

(Model 19130 feeder is product of Proportioneers, Inc., div. of B-I-F Industries, Inc., 345 Harris Ave., Providence, Rhode Island.)

Check 4153 opposite last page.

Step ladder safer with pyramid design

A recently developed design of step ladder places the stanchions farther apart at the bottom than they are at the top, and makes the entire unit very sturdy. This pyramid design makes the ladder safer

Safe step ladder encourages better, faster work

and gives a distinct feeling of security to those whose work requires use. Various sizes are available.

(Safety step ladder is product of Ballymore Co., West Chester, Pa.)

Check 4154 opposite last page.

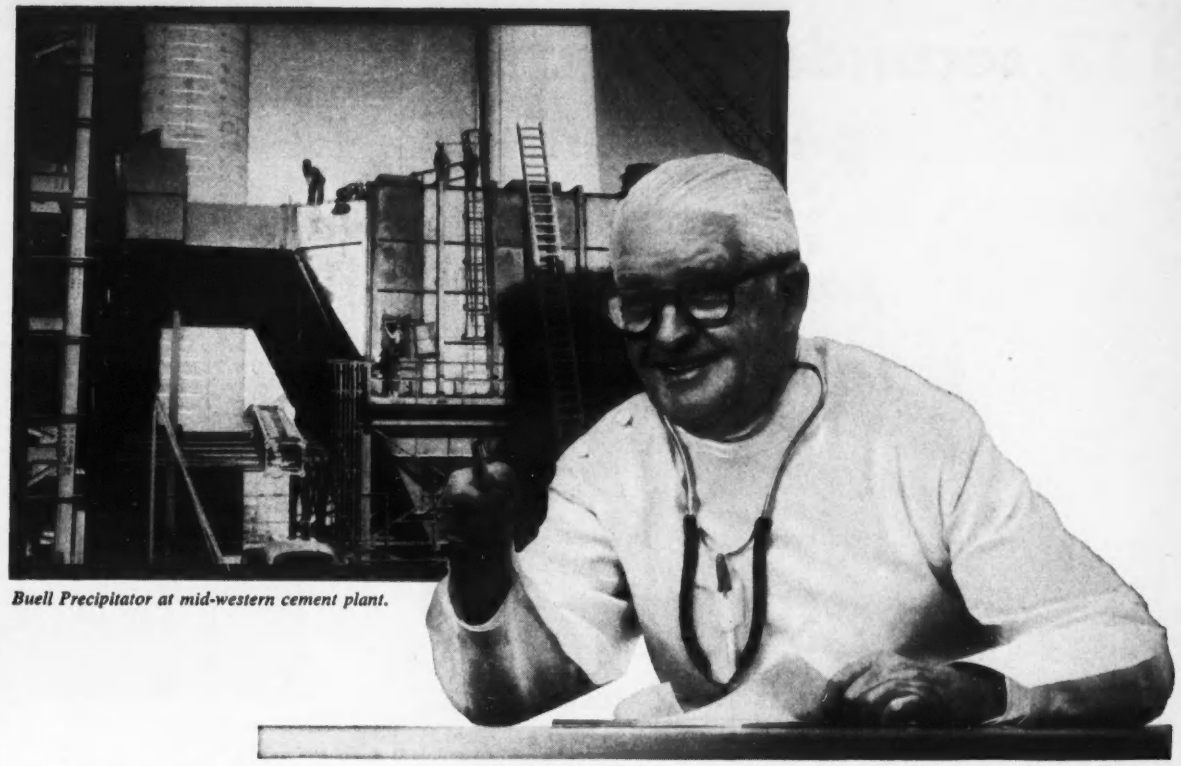
Low-price work glove has outstanding grip, wear features

Thousands of tiny non-skid plastic dots, embedded in fabric of work gloves, provide outstanding safety grip without sweating hands or tiring fingers. Every square inch of glove contains 300 tough little dots, permanently molded into cloth. Laboratory tests show that abrasive wear is absorbed by dots, with little or no wear in fabric itself.

Glove is lightweight and flexible. Fabric "breathes" between dots, permitting rapid evaporation of perspiration.

("Mighty-Grip" work gloves are product of Industrial Glove Div., Riegel Textile Corporation, Conover, N.C.)

Check 4155 opposite last page.

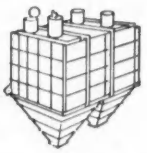


Buell Precipitator at mid-western cement plant.

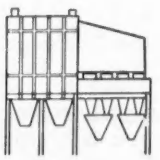
Specialists in treatments for the flue

Hundreds of installations have proved the extra efficiency of Buell Dust Collection Systems. In mechanical collectors, only Buell cyclones have the exclusive Shave-off that traps an extra percentage of dust, large-diameter design that eliminates bridging and clogging. In electrical collectors, only Buell "SF" precipitators have features like high-emission, failure-proof Spiralectrodes. The results are high collection efficiency, freedom from shut-downs, minimum or no maintenance year after year in every Buell installation. Get the full story in "The Collection and Recovery of Industrial Dusts." Write Dept. **11-C,** Buell Engineering Company, Inc., 123 William Street, New York 38, New York.

BUELL CYCLONE



"SF" ELECTRIC PRECIPITATORS



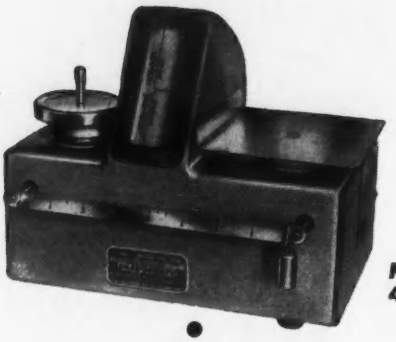
PRECIPITATOR-CYCLONE COMBINATION

buell®

Experts at delivering Extra Efficiency in **DUST COLLECTION SYSTEMS**

Check 4156 opposite last page

1:13 seconds per weighing



MODEL 4204

with fast, accurate SHADOGRAPH® Scales

FOR LABORATORY WORK . . . CHECKWEIGHING . . . CENTRIFUGE BALANCING . . . COMPOUNDING

CAPACITIES — from 2,000 milligrams with 1 milligram visible sensitivity, up to 100 lbs. with 1/4 ounce visible sensitivity. Available with avoirdupois or metric dial and beam.

Most Shadographs are available with explosion-resistant features for use in locations where scales must comply with safety regulations.

Shadographs weigh accurately in out-of-level positions. The 1:1 ratio lever system is unaffected by normal machinery vibration.

Short lever fall and adjustable dashpot give increased speed and reduce wear at points of contact. Built for long, useful life with minimum service.

Shadographs are available with crystal photocell controls for operating visual and audible signals, or for controlling auxiliary machinery or equipment.

Write for literature form 3333.

Exact Weight SCALES

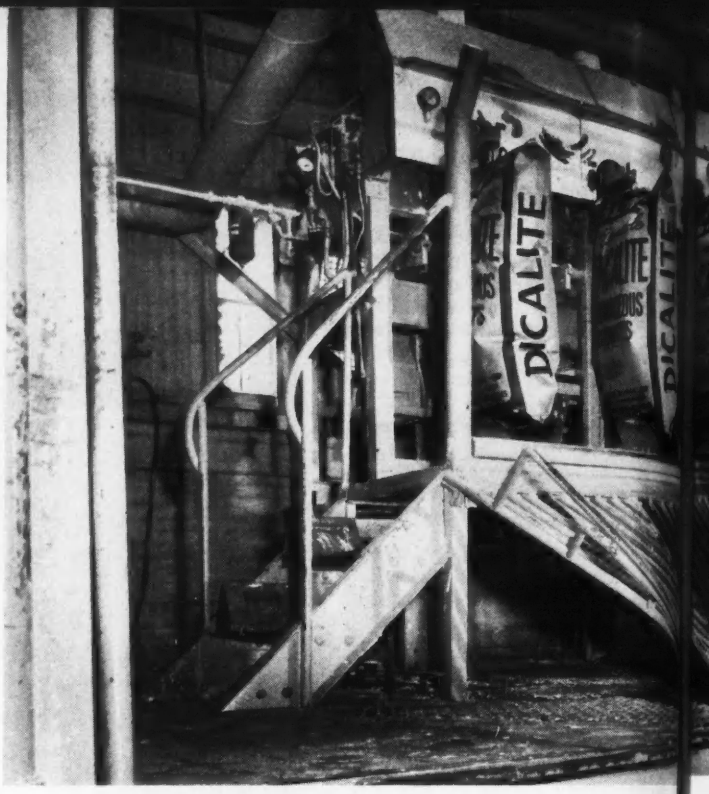
THE EXACT WEIGHT SCALE CO.
905 W. FIFTH AVE., COLUMBUS 8, OHIO
In Canada: P.O. Box 179, Station S, Toronto 18, Ont.

Sales and Service Coast to Coast

Find us in your local "Yellow Pages"

BETTER QUALITY CONTROL . . . BETTER COST CONTROL

Check 4157 opposite last page



Great Lakes Carbon's Dicalite Division was experiencing high maintenance costs, unsatisfactory operation on former diatomaceous earth packing line. But switching to fluidized packing method . . .

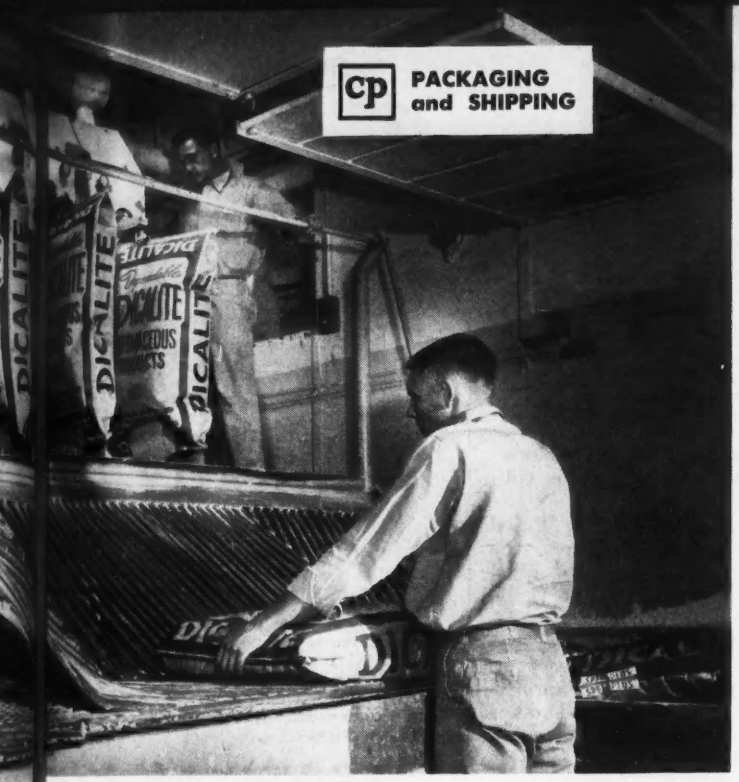
cut packaging costs:

- **Maintenance by $7000/year**
- **Operation by 120 man-hours/week**
- **Spillage by 500 tons/year**

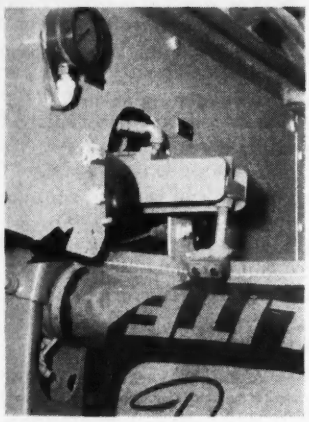
Problem: Great Lakes Carbon's Dicalite plant at Walteria, California, was incurring high maintenance costs on packing equipment for diatomaceous earth.

Dust control was also troublesome and costly. Constant clean-up was in progress. Product spillage represented another source of cost in the packaging operation.

Solution: When a fluidizing packer became available, Dicalite, one of the first to make use of it, installed a battery of four packers. Diatomite materials are fluidized by low-pressure compressed air. The closed system allows fluidized material to flow into bags without the aid of moving parts, eliminating wear experienced with former packers. Bags are filled in 7 seconds. Valve-type bags are used and an inflatable rubber seal at the filling spout seals the bag during the filling operation so that no dust escapes. Operator places bag on one filling spout and then moves to next spout to remove bags that have been



Filled bag goes down chute to loader as operator places new bag on filling spout and prepares to go to next filled bag



Close-up shows sleeve valve of bag in place and sealed by inflated rubber ring (arrow)

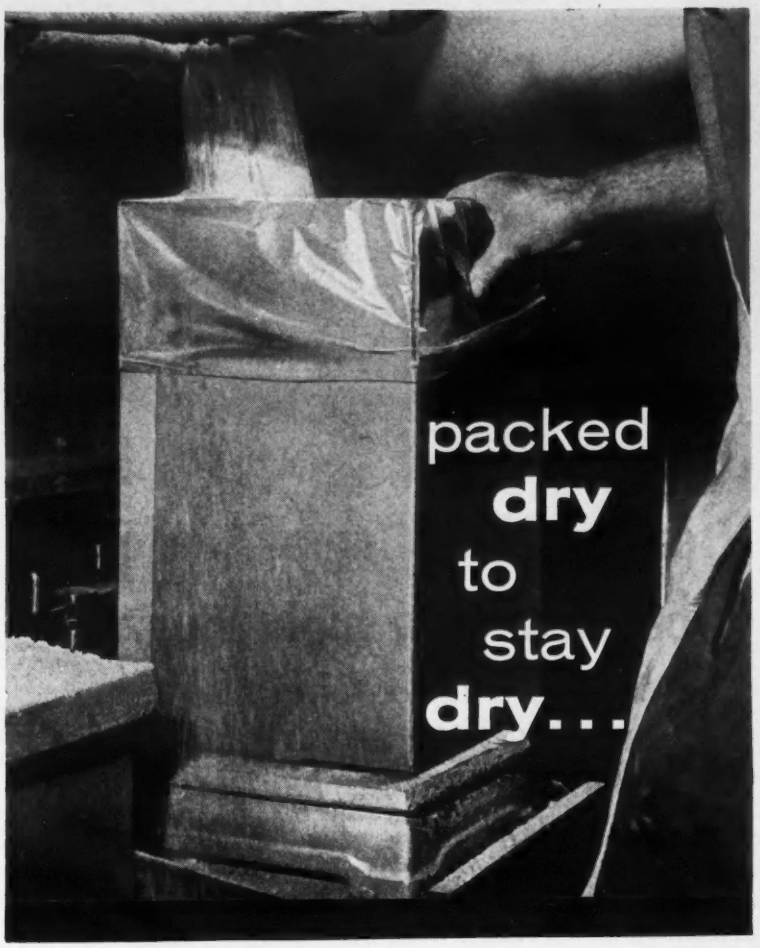
filled. He closes the sleeve valve of the bag, slides the bag down incline to the pallet loaders, places empty bag on spout, and proceeds to next filled bag. Production rate for one man on the four spouts is from five to seven bags per minute.

Machine is quite simple in design and operation. It consists of fluidizing chamber covered by an air pad. Above this is a material supply hopper. Directly above the air pad is an opening to which is mounted a rubber connection and filling tube.

In operation the machine uses no moving parts to cause material to flow through filling tube. Material moves merely because of an unbalanced condition created by the weight of the head of material above the fluidized area. Flow of material takes place as soon as the material in lower portion of supply bin is fluidized sufficiently to allow weight of material above to push it through opening. Action obtained is very similar to that experienced when a valve is opened at the bottom of a tank containing liquid.

Fluidizing takes place at very low pressure, in the range of three to four psi. As a result of this low-pressure, the material is not aerated above its natural rate. Result of lower aeration is less dust and potentially smaller bag than is necessary for impeller filling equipment.

Weight-control is maintained by means of air-operated cut-off lever which squeezes the rubber connection between the filling tube and packer opening. When tube is completely squeezed shut, it presents a positive



in VISQUEEN Trade Mark film

Hygroscopics pick up no moisture in transit or storage when they are packed in drums or cartons with liners of VISQUEEN 'L' film. VISQUEEN 'L' film is film especially made for chemicals and all products easily damaged by moisture.

Strong—and as pinhole free as a polyethylene film can be. Economical too. Saves shipping weight. Gives greater product recovery. Remains pliable at temperatures as low as –72° Fahrenheit.

VISQUEEN *film—the first and foremost polyethylene film. A product of the long experience and outstanding research of*
VISKING COMPANY
P.O. Box 1410, Terre Haute, Indiana division of UNION CARBIDE *Corporation*
In Canada: VISKING COMPANY DIVISION OF UNION CARBIDE CANADA LIMITED, Lindsay, Ontario
VISKING and VISQUEEN are registered trademarks of Union Carbide Corporation.

information request tag
VisQueen
Trade Mark
clip this tag—#CP3
attach to letterhead, mail.

Check 4158 opposite last page

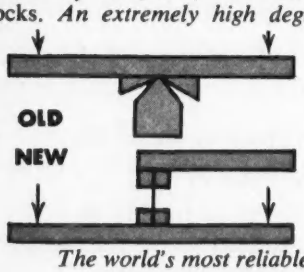
New Valentine Division Plant of A. P. Green Fire Brick Company

Heavy, sticky, lumpy materials batched with high accuracy

Heavy duty batching system requiring little headroom is also capable of handling flooding powders

DO YOU HAVE A BATCHING PROBLEM more difficult than accurately mixing raw clays and grogs which vary from oozy-wet one day to rock-hardness the next? Thayer solves such a rough-and-tumble problem by 1) engineering all the component feeders, hoppers, scales and their automatic controls as one unit and 2) utilizing the unchanging precision of the patented Thayer Plate Leverage System.

THIS EXCLUSIVE LEVERAGE SYSTEM outperforms all others. It is not affected by dust, dirt, vibration or shocks. *An extremely high degree of reliability is maintained* through the use of patented non-fatiguing Thayer Flexure Plates instead of vulnerable knife-edge pivots.



THAYER AUTOWEIGHTION is accepted as the most reliable system of batching or continuous formulating. Thayer Scales have performed millions of weighing operations without maintenance, loss of accuracy or diminished sensitivity.

The world's most reliable leverage system is also available in Thayer filling and checkweighing scales.

THE Thayer SCALE

***THE THAYER SYSTEM OF PROCESS CONTROL BY WEIGHT**

AUTOWEIGHTION

THE THAYER SCALE CORP., 6 Thayer Park, Pembroke, Mass.

Check 4159 opposite last page

PACKAGING

shield which will prevent any leakage of material.

Results: Dicalite engineers report that these *savings* have accrued from the altered packaging method:

Operating Manpower: The total of 120 man-hours per week saved (on a regular 24-hour shift basis).

Maintenance: Savings ranging from 5000 to $7000 per year.

Clean-up: 4500 man-hours/year saved (on 24-hour shift basis).

Accuracy of Filling: Based on one month's figures, the variation of weight of filled RR cars was reduced to ½ the former figures.

Savings Estimate: 287 tons of finished product per year.

Product Quality Improvement: Flow rate and other quality tests on performance of product show measurable increases of filtration efficiency. The gentle air-action of the filling equipment permits closer control of diatom particle size, and distribution of the finished product in the bag.

Spillage: Inflated rubber seal at filling spout prevents product sifting during filling operation. Loss of finished product reduced by 300 to 500 tons, per year.

(Fluopacker is distributed by St. Regis Paper Company, 230 Park Ave., New York 17, New York.)

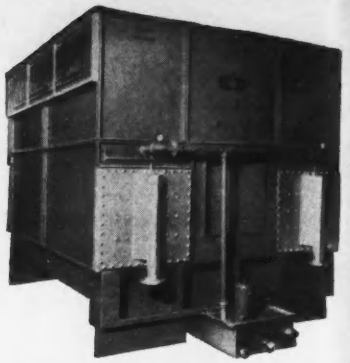
Check 4160 opposite last page.

Dust-free sterile conditions for filling, sealing process in stainless enclosure

Sufficient positive pressure continuously maintained

Uses: For providing dust-free, sterile conditions in filling and sealing operations of pharmaceuticals, and other sensitive material.

Features: In operation, enclosure is continuously maintained at sufficient positive pressure so that air flow is always outwards, even though an access door or delivery port is open. Only air entering enclosure is through intake



Is your plant CRITICALLY SHORT of WATER?

You will make major water savings, reduce your costs, solve your problems of water supply or disposal and get HIGH OPERATIONAL EFFICIENCY with Niagara "Aero" Evaporative Heat Exchangers, After Coolers or Condensers for these important plant services or processes:

- **AFTER COOLING and air drying for large air and gas compressors and AIR LIQUEFACTION**
- **COOLING ENGINES, COMPRESSORS, HYDRAULIC PRESSES**
- **COOLING QUENCH BATHS, FURNACES, INERT ATMOSPHERES**
- **COOLING ROLLS, WELDERS, DRAWING OR EXTRUSION DIES**
- **PRODUCT AND PROCESS COOLING CHEMICALS OR INTERMEDIATES**
- **COOLING LIQUIDS OR GASES IN CLOSED SYSTEMS**
- **VAPOR CONDENSING UNDER VACUUM**
- **ELECTRONIC PROCESS COOLING**

High operational efficiency means: precise temperature for improved product and process quality control, heat removal at rate of input, simple operating conditions, real economy in upkeep, sustained full capacity.

Also it means cooling in a closed system with your product kept free from contamination or, when condensing, getting a pure condensate holding high quality in your product or material.

Niagara machines do the work of a cooling tower plus shell-and-tube coolers with a single machine that saves piping, water handling disposal and treatment expense and 95% of water consumed by contact cooling methods.

Write for Bulletin 129, 130, 132, 136R.

NIAGARA BLOWER COMPANY

Over 35 years of Service in Industrial Air Engineering

Dept. CP-3, 405 Lexington Avenue NEW YORK 17, N. Y.

District Engineers in Principal Cities of U. S. and Canada

Check 4161 opposite last page

baffles at top of unit, where air first passes through electronic precipitator with ionizing cell or glass-fiber filters. It then passes series of u-v lamps for sterilization, before being distributed into enclosure.

Description: Enclosures are fabricated from type 304 Stainless Steel, polished inside and out. All joints are crevice-free, flush-welded to help maintain sanitary conditions and to facilitate cleaning. Enclosures are equipped with large observation windows on all four sides, two access doors for adjustment and maintenance, built-in glove ports, and a filling door for replenishing supply of bottles or ampules. All doors and windows are neoprene rubber-gasketed and all corners are vulcanized for reliable dust-tight sealing.

Interior of enclosure is well illuminated with fluorescent lamps mounted on top and sides. In addition, unit contains u-v lamps which sterilize incoming ampules, vials, or stoppers. Stoppers are gravity fed from hopper on top of enclosure so that supply can be replenished without opening machine. When sealing ampules, exhaust gasses from burners are vented to outside through flexible tube. Interlocking switches on all access doors shut off u-v lamps over work area, as soon as door is opened, to protect the operator.

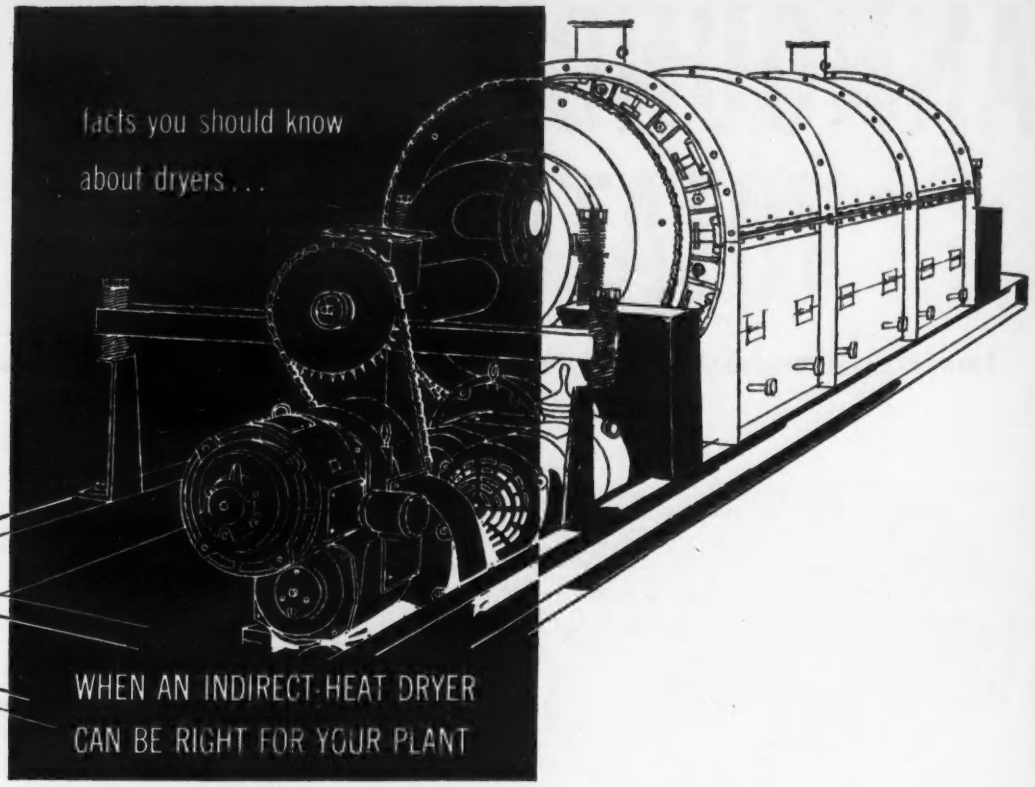
(Stainless steel enclosures may be obtained from S. Blickman Inc., 8400 Gregory Avenue, Weehawken, N. J.)

Check 4162 opposite last page.

Polyethylene drums

Evaluation of molded polyethylene drums in steel, plywood and wire-bound overpacks, as a result of simulated service tests, is presented in 16-page report. To obtain PB 121907, remit 50 cents direct to Office of Technical Services, U. S. Department of Commerce, Washington 25, D.C.

Check 4163 opposite last page.



For over 55 years, Louisville Dryers have been solving industry's drying problems and effecting marked economies. The records of this experience can often be applied to specific cases, possibly yours. For example . . .

Q. *My material is a filter cake, practically all minus 325 mesh, and must not contact furnace gases. It can be heated to 500° F. at least, without injury. What type of dryer would do the job best?*

A. You might consider using a direct-heat rotary dryer that utilizes clean, heated air as the drying medium—air heated by steam coils or a gas or oil fired heat exchanger. However, this introduces a considerable dust collection problem. Besides, from a standpoint of capacity, it is inefficient as well as from a heat-cost standpoint. This makes it unduly expensive. Therefore, a type of indirect-heat rotary dryer is indicated which would greatly reduce both the dust problem and the heat cost.

Q. *What is meant by an indirect-heat rotary dryer?*

A. One in which the material to be dried is warmed by contact with the heated metal surfaces, which in turn are heated by the medium used (usually furnace gases or steam). Those using furnace gases are called "indirect fire dryers". Atmospheric and vacuum drum dryers are examples of steam-heated indirect dryers, but the type in greatest use is the steam tube dryer. This is often referred to as the "Louisville Type" because of the thousands of Louisville Steam Tube Dryers built during the past 55 years.

Q. *How does an indirect-heat dryer minimize the dust problem?*

A. In an indirect-heat dryer, only enough air is admitted to carry off the evaporated moisture. Thus, the air has nothing to do with the heating of the material. Generally, this low air velocity results in insignificant dust loss.

Q. *How does this differ from the operation of a direct-heat dryer?*

A. In direct-heat dryers, the hot air furnishes the heat for drying besides removing the evaporated moisture. The amount needed to supply the necessary heat results in a sufficiently high velocity through the dryer to carry out an excessive amount of fine material particles.

Q. *It seems I need an indirect-heat dryer. How can I get competent advice and more information regarding my particular requirements?*

A. The Louisville Dryer engineering staff will be glad to analyze your requirements, arrange for necessary pilot plant tests, and submit an unbiased recommendation accompanied by estimated costs. You incur no obligation by using this service.

GENERAL TRADE MARK

LOUISVILLE DRYING MACHINERY UNIT

GENERAL AMERICAN TRANSPORTATION CORPORATION

Dryer General Sales Office: 139 So. Fourth Street, Louisville 2, Kentucky
Eastern Sales Office: 380 Madison Avenue, New York 17, New York
In Canada: Canadian Locomotive Company, Ltd., Kingston, Ontario, Canada
General Offices: 135 S. La Salle Street, Chicago 90, Illinois

Check 4164 opposite last page

ANNOUNCING THE NEW VOTATOR FILLER

for continuous, high-speed, accurate packaging

New 36-station VOTATOR Piston Type Filler has production rate as high as 1000 per minute. Other models with lower production rates are available.

GIRDLER has acquired all rights for the manufacture and sale of the fast, accurate "Librascope" Fillers. Thus, Girdler applies its 30 years of process industry experience and its precision-production facilities to bring you high standards of packaging economy.

By adding this new line of VOTATOR Fillers to its line of VOTATOR* Heat Transfer Apparatus, Girdler affords many manufacturers a closer integration of processing and packaging operations.

The new VOTATOR Fillers have distinctive improvements for more profitable packaging of many liquid and viscous products. They are fully described in Bulletin PED 257, free on request.

*VOTATOR—Trade-Mark Reg. U.S. Pat. Off.

GIRDLER

PROCESS EQUIPMENT DIVISION

NATIONAL CYLINDER GAS COMPANY

Louisville 1, Kentucky

Manufacturers of VOTATOR and THERMEX Processing Apparatus

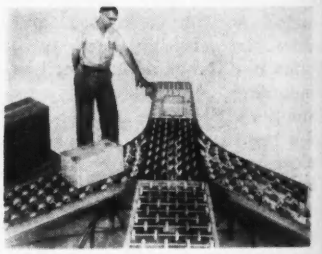
Sales Offices: Louisville, New York, Chicago, Atlanta, San Francisco

Compact, 3-way switch automatically classifies and routes packages

Uses: For automatically sorting packages according to size, weight, or classification.

Features: Compact, simply operated switch provides quick, positive means of dispatching packages into side aisles or straight through without use of deflectors, saving many hours of manual switching and sorting.

Description: Three-way switch may be controlled by remote pushbuttons, limit switches, photoelectric cells, and other electrical means. Limit switches automatically classify by package heights. Scale controls divert underweight and overweight packages to right and left, while those that measure correctly pass straight ahead.



Packages are automatically sorted according to size, weight, or classification by three-way switch

Series of classifications can be made through these switches to bring like packages into proper storage line. In case main conveyor line is blocked, automatic diversion to by-pass line can be made. After complete loading of one storage line, loading can be automatically switched to second and third line. Switches can also be used to feed tributary lines into common main line. Switch brings in new line when cartons from one line have been cleared. In this case, electrically operated

For more information on product at right, specify 4166 . . . see information request blank opposite last page.

Check 4165 opposite last page

Just as you see it * *here...*

MULTIWALL BAGS

with a BACKGROUND

by

Raymond

BAG CORPORATION

A division of Alternate Paper Mfg. Co.

MIDDLETOWN, OHIO • RICHMOND, VA.

* This is Raymond Pre-Printed Burlap Background on 50 lb. unbleached multiwall kraft which can be economically combined with your regular bag design and specifications. Other Raymond basic background designs and colors are available on colored, bleached or semi-bleached kraft. For full details on the interesting possibilities this new packaging concept can give your product, see, write or call your Raymond representative.

MULTIWALL
BAGS

stops work simultaneously with switch.

Standardized conveyor widths are 12, 15, 18, and 24". Turns are either 45 or 90°. Each wheel is securely locked in place and can turn in varying degrees to pre-determined angle required to safely guide packages around curve. Switch is also made for manual control. Single hand-lever switches package travel to any of three directions.

(Three-way conveyor switch is product of E. W. Buschman Company, Clifton and Spring Grove Aves., Cincinnati 32, Ohio.)

Check 4167 opposite last page.

Aerosol bottle made of nylon

Round 4-oz container available in standard colors

A strong nylon aerosol container, made of Du Pont's Zytel 42, has been developed. It is currently being offered in a four-ounce size, in the Boston Round shape. Additional sizes and package shapes will also be available.

Sturdy aerosol container is made of nylon

The container is currently made in natural (light straw) and standard colors. Valve and protective caps can be obtained from various valve and closure manufacturers.

(Nylon aerosol bottle is available from Plastic Container Div., Continental Can Co., 2930 N. Ashland Ave., Chicago 13, Ill.)

Check 4168 opposite last page.

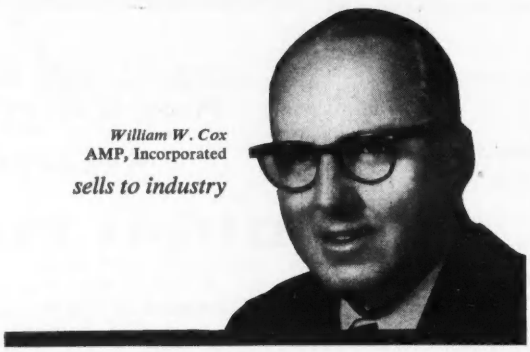
Can *specialized* business publication advertising actually sell?

By reputation, salesmen are reluctant to credit anything but their own selling efforts for getting names on the dotted line.

Actually, it's quite a different story. The most successful salesmen will tell you two important things about selling. 1. That the selling process is largely a matter of communicating ideas. 2. And that specialized business publication advertising can help importantly to register information with prospects.

Of course each salesman will express this in his own way . . . but they all agree that selling would be far more difficult without the advertising that appears in the industrial, trade, and professional publications that serve the specialized markets to which they sell.

Here, for instance, is what a salesman has to say about this kind of advertising:



William W. Cox
AMP, Incorporated
sells to industry

Says Mr. Cox:

"The quickest way we can introduce a product is by introducing it through advertising in business papers. That way we get it around faster than we can by word of mouth alone. On occasion my home office has inquiries out to me before I can get to the customer or prospect to introduce a new product. They've already seen it in a trade magazine.

"It's interesting to note that within the last two weeks I received a survey which shows about 80% of the new customers we get on our books come through our trade publication advertising. Of course, our company is only 15 years old and we have grown from what you might say, *nothing,* to the biggest in our business. Certainly a lot of that has come from our advertising campaigns. Our name is known throughout the world right now, purely because of our advertising program. When I go to a prospect now, they know my company, they know my product . . . it makes my job easier, and opens doors when I have to make cold calls."

Ask your own salesmen what your company's business publication advertising does for them. If their answers are generally favorable you can be sure that your business publication advertising is really helping them sell. If too many answers are negative it could well pay you to review your advertising objectives—and to make sure the publications that carry your advertising are read by the men who must be sold.

How salesmen use their companies' advertising to get more business

Here's a useful and effective package of ideas for the sales manager, advertising manager or agency man who would like to get more horsepower out of his advertising. Send for a free copy of the pocket size booklet entitled, "How Salesmen Use Advertising in Their Selling," which reports the successful methods employed by eleven salesmen who tell how they get more value out of their companies' advertising.

You'll find represented many interesting variations in how they do this. Some are very ingenious; all are effective. You can be sure that more of your salesmen will use your advertising after they read how others get business through these simple methods.

The coupon is for your convenience in sending for your free copy. Then, if you decide you want to provide your salesmen with additional copies, they are available from NBP Headquarters in Washington, at twenty-five cents each. Or if you choose you can reprint the material yourself and distribute it as widely as you please. But first, send for your free copy.

NATIONAL BUSINESS PUBLICATIONS, INC.
Department 4D
1413 K Street, N. W.
Washington 5, D. C. **STerling 3-7533**

Please send me a free copy of the NBP booklet "How Salesmen Use Advertising in Their Selling."

Name _____

Title _____

Company _____

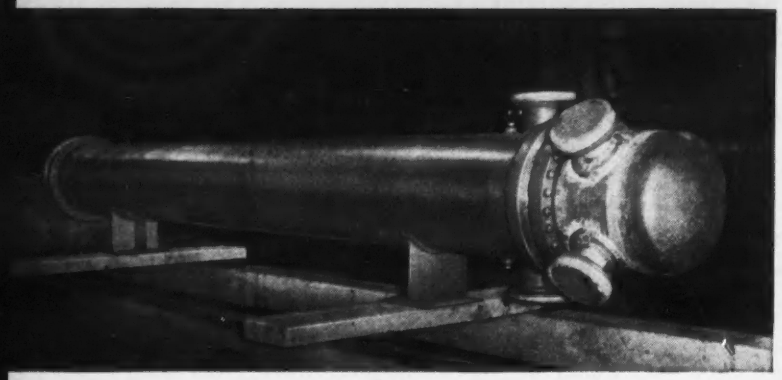
Street Address _____

City _____ Zone _____ State _____

National Business Publications, Inc.

NBP

. . . each of which serves a specialized market in a specific industry, trade or profession.



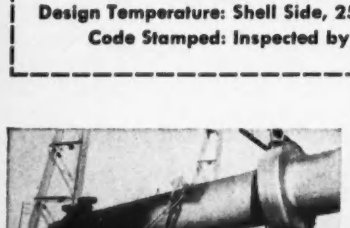
Aluminum translated by Downingtown ...metallurgically speaking

The special problems of aluminum welding and fabrication are another metallurgical "language" that has been expertly mastered at Downingtown. In this fixed-tube sheet heat exchanger unit, aluminum heads, tubes and tube sheets have been combined with a carbon steel shell to meet specific service conditions.

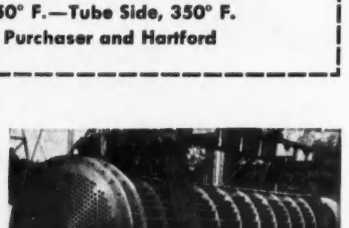
When heat transfer specifications call for aluminum...or aluminum bronze, nickel, copper, stainless steel, or almost any clad or alloy...you'll find the metallurgical idiosyncrasies are well understood at Downingtown. Send for our informative booklet on heat exchanger design.

SPECIFICATIONS OF THE UNIT

Materials: Aluminum Tube Side and Carbon Steel Shell
Tubes: 192 Alclad Tubes, ¾" O.D. x 16 ga. x 14'0" L
Shell Diameter: 18"
Over-All Length: 16' 1"
Design Pressure: Shell Side, 100 psi—Tube Side, 200 psi
Test Pressure: Shell Side, 150 psi—Tube Side, 300 psi
Design Temperature: Shell Side, 250° F.—Tube Side, 350° F.
Code Stamped: Inspected by Purchaser and Hartford



Putting the finishing touch on another heat exchanger unit built by Downingtown. We build to your specs, or do complete design.

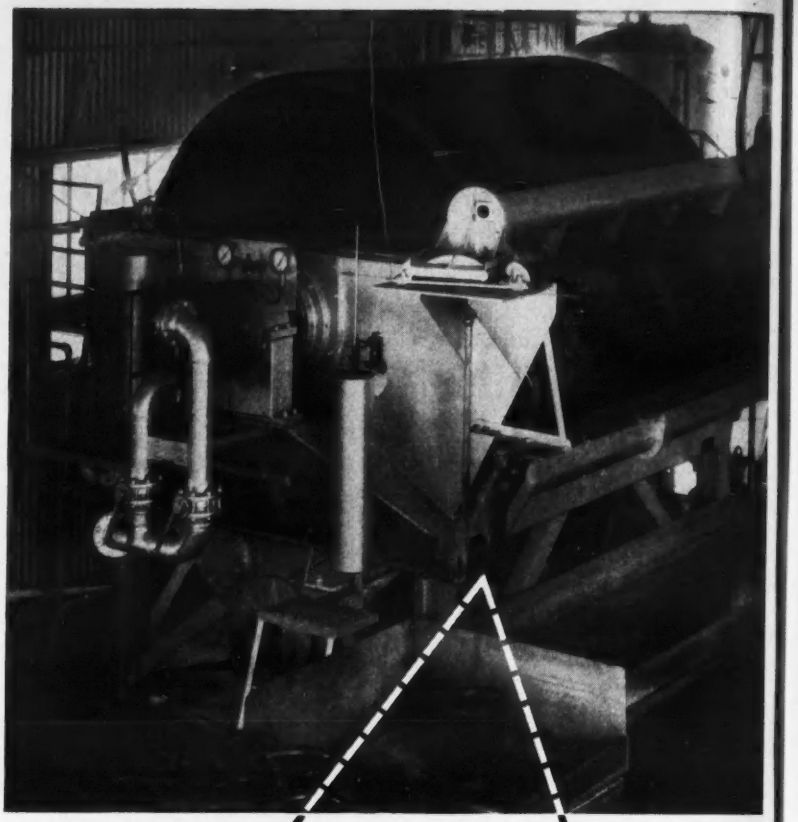


We rolled type 329 stainless steel tubes into types 316 and 304 stainless tube sheets to make this stainless steel replacement bundle.

Downingtown Iron Works, Inc.
144 Wallace Ave., Downingtown, Pennsylvania
division of PRESSED STEEL TANK COMPANY Milwaukee
Branch offices in principal cities

HEAT EXCHANGERS—STEEL AND ALLOY PLATE FABRICATION
CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS

Check 4169 opposite last page



How Barnett Laboratories Inc. Recovers Carotene with

Oliver Precoat Filter...

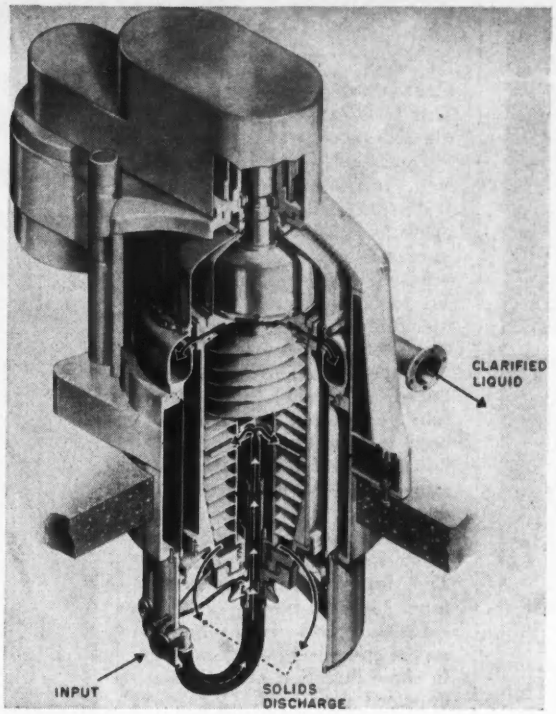
Installed at Barnett Laboratories Inc., Long Beach, California plant, this Oliver Precoat Filter is recovering carotene, a natural food coloring substance, from carrot juice. The Filter is 8′ dia. by 8′ face, constructed of stainless steel.

The present installation is the culmination of several years of close cooperation between Barnett and D-O engineers. Initially, an Oliver Pilot Plant unit was rented for investigating the feasibility of the process. Next, a somewhat larger Oliver was purchased and operated on a semi-works basis. And finally, the present full scale unit was installed for capacity production. This Oliver Precoat has now been operating for over two years and closely approximates the scaled up pilot plant figures.

For the Food Industries, Dorr-Oliver manufactures a complete line of wet processing equipment. If you have a filtration problem, or one involving clarification, centrifuging or waste treatment, just drop a line to Dorr-Oliver Incorporated, Stamford, Conn. No obligation, of course.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

Check 4170 opposite last page



Solids collected against wall of bowl are carried to bottom by means of helical screw conveyor. Clarified liquid leaves at top

Combining peak performance with high production rates, vertical-design pressurized continuous centrifuge . . .

✓ separates solids from slurries at 150 psi

✓ handles 250-gal feed per minute

Uses: Continuously removing solids from slurries and suspensions. Recovering, dewatering, and washing fine crystals and other solids. Classifying solids suspended in liquids.

Features: Vertical-design centrifuges are capable of operating under pressures up to 150 psi. Production capacities of up to 200-250-gal feed slurry per minute, with solids discharge of 10 tons per hour, are possible.

Description: Vertical, decanter-type centrifuges are designed for continuous operation. Solids discharge end of unit is actually a motionless flange connection which links bottom of machine to solids collecting tank, conveyor, or other process vessel. No other bottom seal is required.

Units occupy only minimum floor space. Motor is an integral part of the frame and does not require separate support. Vertical design permits bowl to rotate freely around its own center of gravity, compensating for irregularities in load without stressing fixed bearings or other parts.

Although designed to operate under considerable pressure, unit does not require an elaborate system of seals to prevent leakage. Single seal at top of machine seals off entire gear box and shaft assembly, resulting in only minimum maintenance. Seal is located at maximum distance from process stream. Centrifuge has only one set of main bearings.

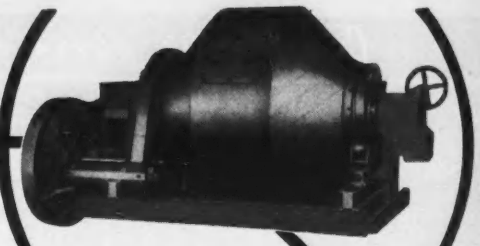
Two models are available: The P-7000 centrifuge has 29″ diam x 59″ bowl revolving at 2000 rpm, creating force equiv-

Specifications

of Pressurized Vertical Centrifuges

	P-7000	P-4000
Bowl size, inches	29x59	14x28
Bowl speed (max), rpm	2000	4000
Centrifugal force, XG	1640	3180
Power range, hp	50-125	10-40
Feed capacity, gpm	200-250	40-60
Solids discharge, tons/hr	10-12	1-1.5
Price range, dollars	30,000-60,000	16,000-27,000

MUNSON



Here's why more and more MUNSONS are doing the important mixing jobs

ROTARY BATCH MIXER

• Munson Mixers will quickly blend various chemical compounds into a homogeneous, accurate mixture, no reduction in particle sizes • They blend powders and granules • Spray pipes may be installed to spray liquids on dust and granular materials • Internal vent pipe to expel toxic fumes • Drum may be heated or cooled • Granular fertilizers can be coated with insecticide dust • Will blend chemicals, fertilizers, insecticides, herbicides, antibiotics, and many other materials • Available in several models • Low horsepower • 20 to 250 cu. ft. mixing capacity

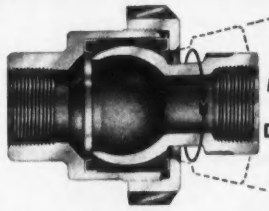
TELL US YOUR MIXING PROBLEMS . . . write or phone for the complete story on Munson Rotary Batch Mixers.

MUNSON MILL MACHINERY COMPANY
Dept. P-358 210 Seward Ave., Utica, N.Y.

Check 4171 opposite last page

BARCO *Flexible* BALL JOINTS

—when you need movable joints in piping handling



STEAM, OIL, CHEMICALS

Send for New Bulletin No. 215B

- Provides for movement in piping—up to 40° side flexibility, plus 360° rotating movement.
- Stainless steel and chemically inert gaskets for strong chemicals. No metal-to-metal contact. Choice of body materials.
- One Barco Ball Joint does the work of two or more ordinary swivel joints because "it moves in any direction!"
- Many models available. For pressures to 4,500 psi; temperatures to 1000°F. 15 different sizes. ¼″ to 12″. *Ask for recommendations.* BARCO MFG. CO., 537D Hough St., Barrington, Illinois.

THE ONLY TRULY COMPLETE LINE OF FLEXIBLE BALL, SWIVEL, SWING AND REVOLVING JOINTS

Check 4172 opposite last page

alent to 1640 times gravity. This is the unit that can handle 250-gal slurry per minute.

The P-4000 is of similar design, but somewhat smaller. It has 14″ diam x 28″ bowl, operates at 4000 rpm, creating force equal to 3180 times gravity. Unit can handle from 40- to 60-gal slurry per minute. Solids discharge rate is 1 to 1.5 tons per hour.

In operation, slurry is introduced into bowl by a feed tube connected at base of bowl to a hollow shaft. Slurry flows up shaft to ports about midway in bowl. Here it is distributed into the centrifugal force field. Solids are deposited against wall of bowl. The liquid forms concentric inner layer in bowl.

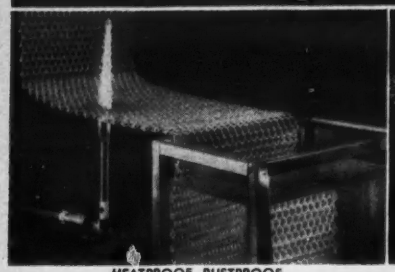
Inside bowl is a helical screw conveyor which rotates in same direction but at slower speed than bowl. Conveyor is so pitched that solids are conveyed to bottom of bowl where they are discharged through ports.

As in gravity settling, liquid near top of liquid layer has greatest clarity. Clarified liquid continuously overflows adjustable weirs at top of bowl (see drawing) from where it is discharged.

(P-7000 and P-4000 Super-D-Canters are product of The Sharples Corporation, 2300 Westmoreland Street, Philadelphia 40, Pennsylvania.)

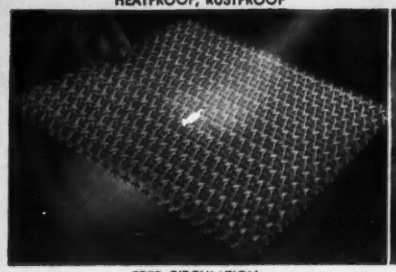
Check 4174 opposite last page.

Cambridge WOVEN WIRE BELTS



HEATPROOF, RUSTPROOF

FLASH DRAINAGE



FREE CIRCULATION

NO SEAMS OR LACERS

METAL-MESH BELTS GIVE FAST, UNIFORM PROCESSING AT LESS COST

Whether you process slab, sheet or pelletized materials through wet, dry, hot or cold operations, Cambridge belts can combine movement with processing to give you increased production, and higher product uniformity at lower operating costs. Here's how:

CONTINUOUSLY MOVING BELTS ELIMINATE BATCH PROCESSING—give faster, less costly production; reduce slow, costly manual handling.

OPEN MESH PROVIDES FREE AIR, LIQUID CIRCULATION—atmospheres and solutions circulate through the belt and around product for fast, uniform processing, flash drainage. Close mesh can't mar or mark soft slab or sheet products.

ALL-METAL CONSTRUCTION IS HEATPROOF, COLDPROOF, RUSTPROOF—Cambridge Belts can be woven from any metal or alloy to take up to 2100° F. or sub-zero temperatures, yet remain impervious to attack from water, acids or caustic solutions.

SPECIAL SURFACE ATTACHMENTS AVAILABLE—raised edges and cross flights to keep product on belt during movement.

Currently, Cambridge Belts are used in the chemical industry for such diversified operations as bagging cement, drying wool, cooling and drying polyethylene sheets, washing, rinsing and drying catalysts, tanning hides, drying coal, and processing rubber.

Talk to your Cambridge Field Engineer soon. He'll recommend the belt size, mesh or weave—in the metal or alloy best suited to your operations. You'll find his name in the classified phone book under "BELTING-MECHANICAL". Or, write for FREE 130-PAGE REFERENCE MANUAL giving mesh specifications, design information and metallurgical data.

The Cambridge Wire Cloth Co.

WIRE CLOTH | METAL MESH CONVEYOR BELTS | WIRE CLOTH FABRICATIONS

Department F, Cambridge 3, Maryland

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

Check 4173 opposite last page

DANA CHEMICAL CO.

"We've just got to do something about this foaming problem!"

Thanks to Joe Dilts, E. I. du Pont de Nemours & Company, Inc., Wilmington, Delaware.

CONTINUOUS LIQUID, GAS OR SLURRY CHEMICAL MIXING

American HOMOMIX®

Gives instant, uniform, complete mixing *without a mixing tank*

Saves space, time and equipment. Simplifies and speeds the blending of one or more chemicals. Permits a wide range in the percentage of additives to base fluid and assures accurate, economical mixing control. Any number of diffusing stages can be selected. Provides for visual inspection of the mixing operation and access to diffusing impeller. Can be equipped with lift stage. Can be made of standard or special material and protectively coated. Easily installed in vertical, horizontal or inclined position. Wide range of sizes and capacities from 1 GPM to 15,000 GPM.

Send for Technical Supplement HM or for details on your application.

(Patented)

IN OUR 90TH YEAR

AMERICAN WELL WORKS

Mixing, Pumping, Water & Waste Treatment Equipment

150 N. BROADWAY, AURORA, ILLINOIS

Sales Offices: Chicago, New York, and other principal cities

Check 4175 opposite last page

Compact, mobile unit mixes, transfers, and transports

Mixes by jet impingement, can handle up to 25 gal

Uses: Mixing, transferring, and transporting various chemicals.

Features: Mobile unit can handle up to 25 gallons. Mixing is performed by jet impingement principle. Centrifugal transfer pump can lift product to height of 12 ft at rate of 17 gpm.

Description: Tank is made of high-impact white plastic. Unit's metal base has corrosion-resistant finish. Mounted on casters, machine can be moved with minimum effort. Unit measures 21" square and 36" high. It operates on 115 volts and weighs 125 pounds.

Mounted on casters, unit can be moved to any part of plant

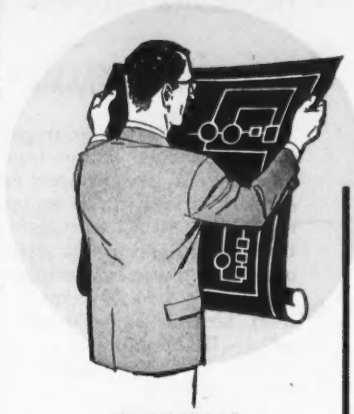
(Hydromixer is product of Pako Corporation, 1010 Lyndale Ave., N. Minneapolis 11, Minnesota.)

Check 4176 opposite last page.

New kiln design

Manufacturer's brochure of 4 pages briefly summarizes new concept in rotary kiln design. Rotary kiln bul — Vulcan Iron Works, PO Box 570, Wilkes-Barre, Pa.

Check 4177 opposite last page.



Partial List of Material Processed with Allis-Chalmers Heat Transfer Equipment

- Limestone
- Lime
- Dolomite
- Magnesia
- Alumina
- Bauxite
- Manganese Oxide
- Iron Ore
- Phosphates
- Refractories
- Foundry Sand
- Petroleum Sand
- Petroleum Coke
- Fuller's Earth
- Nickel Ores
- Copper

How Allis-Chalmers Can Help You

Cut Heat Transfer Costs

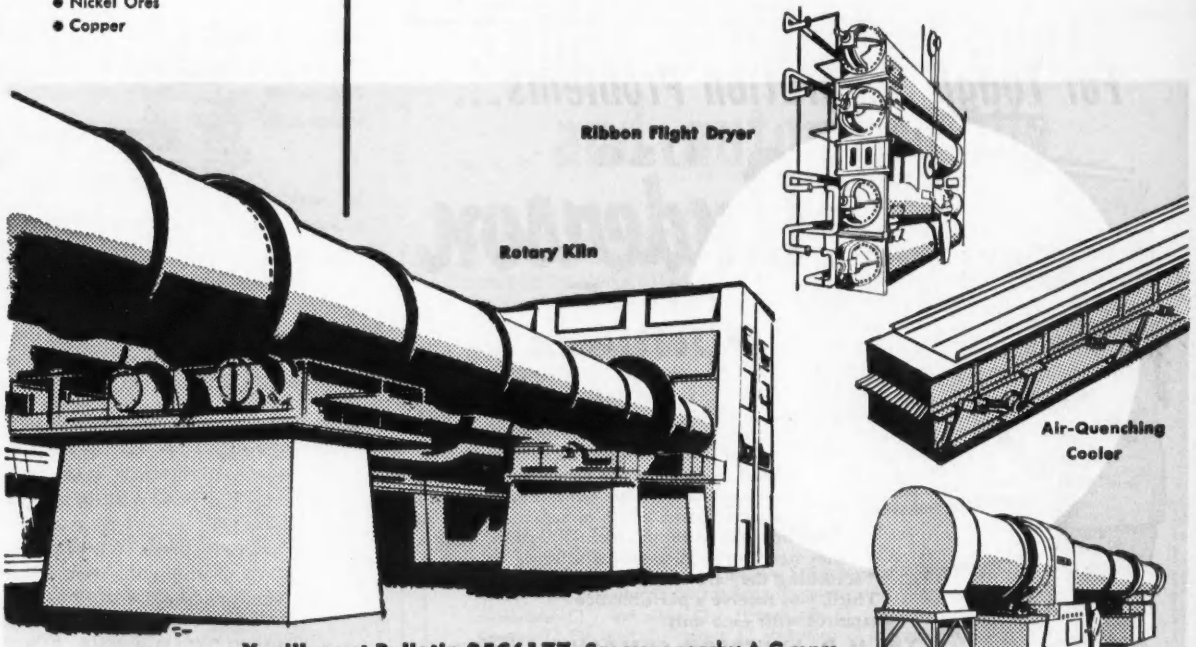
Obtaining increased production, lower processing costs and improved product quality is more than a matter of installing the best heat transfer equipment. Maximum utilization of that equipment also calls for an *efficient flow design*. You get *both* from Allis-Chalmers.

A-C Engineers Work With Your Staff or Consulting Engineers

Allis-Chalmers engineers concern themselves with overall operation . . . the evaluation of variables . . . plant design . . . the integration of interdependent equipment into a complete process.

Pre-recommendation research, testing and, of course, expert installation and localized field service are also available from Allis-Chalmers — the world's leading manufacturer of rotary kilns, coolers and associated equipment.

Equally important is the fact that Allis-Chalmers interest in your problems is continuous. Laboratory services, periodic equipment check-up and parts service are yours for the life of the equipment — and a long life it is, too.



You'll want Bulletin 25C6177. See your nearby A-C representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5325

Check 4178 opposite last page

can't beat **Model RA**

FOR MEDIUM TO HEAVY MIXING

AGITATOR PARTS QUICKLY REMOVABLE FOR EASY CLEANING

Stainless steel throughout. Fully sanitary—meets the strictest Health Dept. requirements. Equipped with GROEN-exclusive demountable shaft couplings which cannot disengage in operation, yet permit removal of agitator assembly in a few seconds for easy cleaning. • Large revolving scraper blades maintain movement of contents away from heated walls into baffle. Small blades below prevent settling. Efficiency is positive . . . results dependable. Bulletin RAK-2 gives full, illustrated details. Write for your copy today.

IF YOU need EXTRA-HEAVY mixing ask us about TWIN-SHAFT Model TA.

GROEN MFG. CO. 4535 W. Armitage Ave., Chicago 39 • 30 Church St., New York 7

BULLETIN RAK-2
Gives all the facts and figures. Tells how to get faster, better medium to heavy mixing. Write for this Bulletin now.

Half a Century of Fine Kettles GROEN

Check 4179 opposite last page

For Tough Separation Problems...

Use Anderson Hi-eF Purifiers

There are three basic reasons why more Anderson Purifiers, Scrubbers, Mist Extractors and Separators are used to solve tough separation problems than any other make. First, they have no moving parts, filters or screens that wear out or demand replacements. Second, since they need no large areas for filtering or screening they are extremely compact. Third, you receive a performance guarantee with each unit.

THE V. D. ANDERSON COMPANY
division of International Basic Economy Corporation
1948 West 96th Street • Cleveland 2, Ohio
See the Chemical Engineering Catalog

ANDERSON Hi-eF PURIFIERS

FREE PURIFICATION BOOKLET shows how to separate any liquid or entrainment from gases and vapors. Write for copy today.

PURIFIERS • SCRUBBERS • SEPARATORS • MIST EXTRACTORS

Check 4180 opposite last page

Water treatment terms

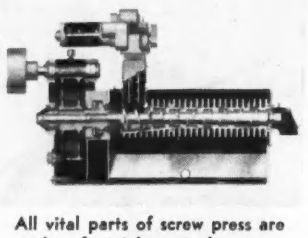
Manufacturer's four-page folder discusses water treatment by ion exchange and describes various water softening equipment. Literature features handy and useful section on water treatment terminology listing over 50 commonly used terms. "Fact-File-Folder" — H. M. Mueller Corporation, 6106 Excelsior Blvd., Minneapolis, Minn.

Check 4181 opposite last page.

Continuous screw press provides top efficiency at low operating cost

Features new concepts in design and construction

Uses: Unit is especially useful for processing 85 to 95% yield pulp, as well as full yield shredded furnishes for dry process hard boards.



All vital parts of screw press are made of stainless steel or corrosion-resisting alloys

Features: New design results in increased efficiency at lower operating costs. Average power input is 1.7-hp days per A.D. ton when pressing pulp to 60% total solids. At 50%, power input drops to 1.3.

Screw press features one-piece weldment base. Drainage area design provides better processing of wet chips, screenings, and pulp. Fiberizing is controlled by adjustment of main shaft arrangement and use of specially designed wave-line screen bars.

Description: High-pressure continuous screw press turns out about 90 to 110 A.D. tons when handling 56-57% moisture N.S.S.C. chips. Output can be varied from ¼ to full load without affecting discharge of pressed material.

Unit has 200-hp motor with poly-vee belt drive. All parts coming in contact with pulp, extracted liquors, or vapors, are made of stainless steel or corrosion-resisting alloys. Exterior of base and gear housing are sprayed with plastic coating.

Truncated conical feed worm provides initial compaction and eliminates voids in flow of material being processed. King-size flight length at large end of feed worm makes feeding of large pieces and low consistency stocks easy.

Full-size commercial unit has been in operation since March 1957 at the Otsego Falls Paper Mills, Otsego, Michigan.

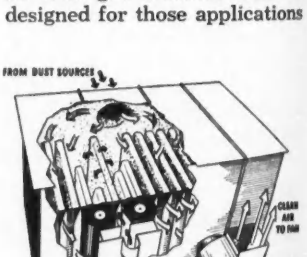
(No. 560 Pressafiner was developed by The Bauer Bros. Co., Springfield, Ohio.)

Check 4182 opposite last page.

More efficient cleaning featured in continuous dust collector

Traveling rolls, air, remove trapped dust from bags

Uses: Removing dust and other foreign particles from air and gas streams. Unit is designed for those applications where the process ventilated is continuous and dust volume and concentration are high.



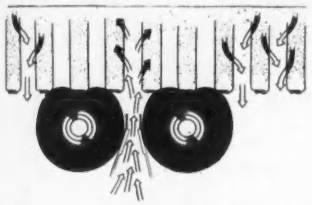
Roller mechanism on dust collector helps to clean unit more efficiently

Features: New "roll clean" method of removing collected dust from unit's filter bags

permits greater filtering capacity, easier filter bag changing, and increased operating efficiency.

Description: Unit retains basic design of manufacturer's original Dynaclone dust collector while providing a more efficient method of cleaning collected dust from the filter bags.

Cleaning mechanism consists of resilient gum rubber rolls, moving back and forth across open ends of filter bags,



Resilient rubber rolls automatically adjust to form positive seal as each row of bags is cleaned by atmospheric air

sealing each bag as it is cleaned by blast of air. The cleaning air is brought into the filter by means of the main operating fan.

Gearhead motor chain-drive moves rolls across the dust wall at rate of 3 ft per min. Rolls automatically adjust for each row of bags. Aluminum center core causes them to press into the dust wall to provide complete seal at every point.

(Roll-Clean Dynaclone is product of The W. W. Sly Manufacturing Company, Cleveland 1, Ohio.)

Check 4183 opposite last page.

Air, gas dryers

Bulletins of four and six pages describe steam and electric reactivated air and gas dryers in which water is removed by adsorption with solid granular desiccant. Flow diagrams, selection charts, and specifications are included. Bul D-102 (steam) and D-103 (electric) — The C. M. Kemp Mfg. Co., 405 East Oliver St., Baltimore 2, Maryland.

Check 4184 opposite last page.

Sam Spinner's Mail Box

by Sam Spinner

Case #1: How can we dry several large bulky items at one time?

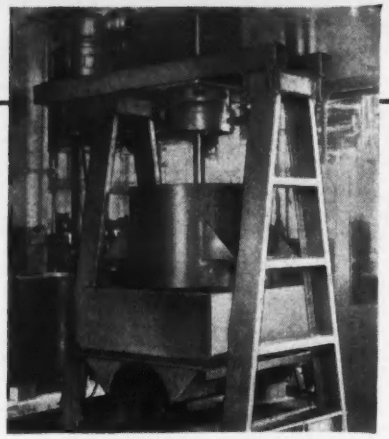
Solution: A T & M Engineers developed a huge Link Type Extractor which would handle loads of several thousand pounds, and also keep power requirements to a minimum.

Case #2: Our Parts Production Line has a bottleneck. Due to the shape of some of our parts, we are unable to handle or unload them in a conventional parts drier. What can you do for us?

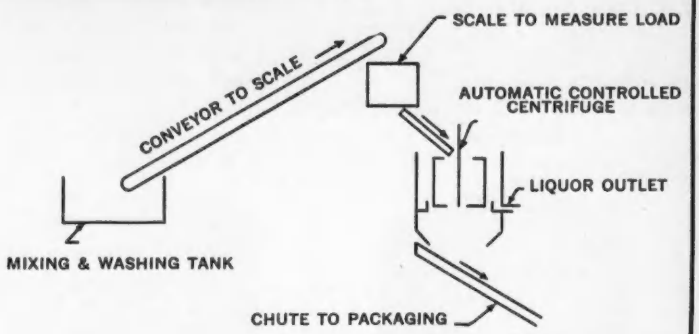
Solution: A Bottom Discharge Machine was developed which not only handles the troublesome parts, but also makes it possible to control entire operation automatically.

Case #3: We have a problem of throwing off excess coating after a hot dip, and are unable to clean unit as easily and fast as we require.

Solution: A special machine was developed to give extra fast acceleration to remove excess coating before solidification. Housing unit was made to open wide to facilitate cleaning in a very short period.



FLOW CHART shows automatic handling of bulk solids in an AT&M centrifugal. Solids are treated more gently than when operators did the material handling.



Solids separated gently ...and automatically

Many "special" chemical processing problems find *the one best answer* in centrifuging engineered by AT&M experts.

Here liquids are to be separated from the solids . . . but the solids must be treated gently. AT&M engineered this machine that handles the products without the use of bags. It carefully loads into the basket through AT&M's slow-speed loading drive. After extraction, the basket is unloaded onto a conveyor by a new type bottom discharge basket without the use of a plow. The whole cycle is performed automatically without need of an attendant.

New AT&M models make maximum use of time and space, with top safety. Send coupon for data.

AMERICAN TOOL & MACHINE COMPANY
1423 Hyde Park Ave., Boston 36, Mass.

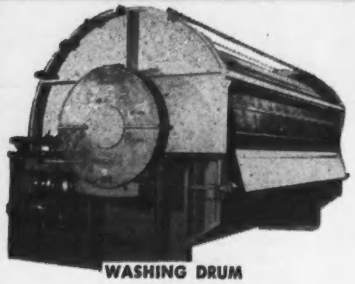
Please send me my free copy of the new AT&M booklet "Centrifugal Force." I am interested in the following processes:

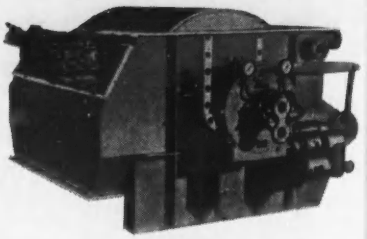
Separation ☐ Extraction ☐ Dehydration ☐ Clarification ☐
Coating ☐ Filtration ☐ Draining ☐ Thickening ☐ Impregnation ☐
Sedimentation ☐

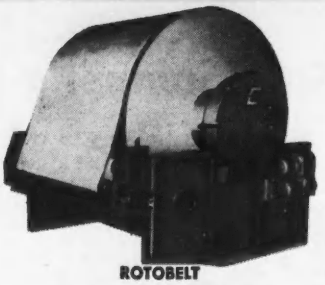
SAVE TIME, SPACE AND COSTS WITH
A.T. and M.
CENTRIFUGING

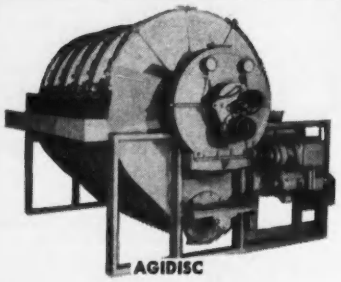
Name.....Title.....
Company.....
Street.....
City.....Zone....State .....

Check 4185 opposite last page

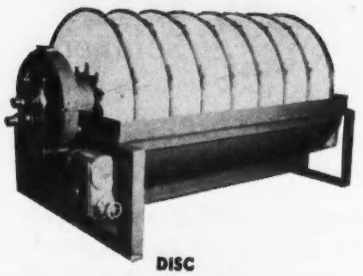

WASHING DRUM

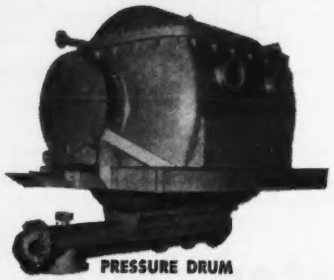

PRECOAT

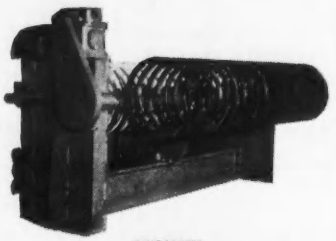

ROTOBELT

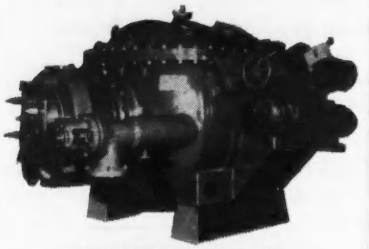

AGIDISC

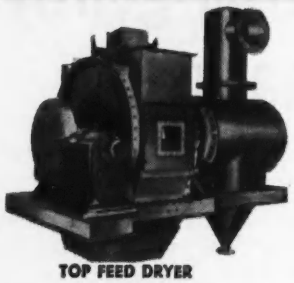
The standard of quality and performance has been set by Eimco Filters. Custom engineered and built to efficiently serve your process needs in a wide variety of both continuous vacuum and pressure designs.

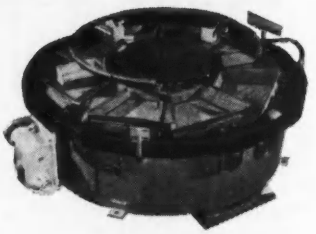

DISC


PRESSURE DRUM


BURWELL


PRESSURE PRECOAT DRUM


TOP FEED DRYER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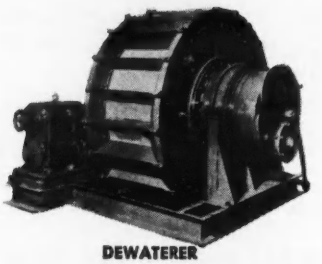
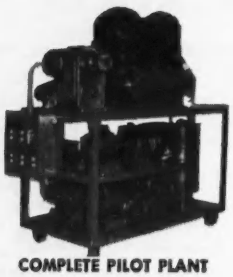
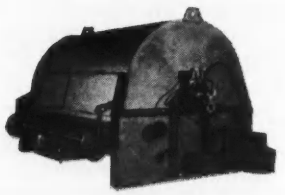
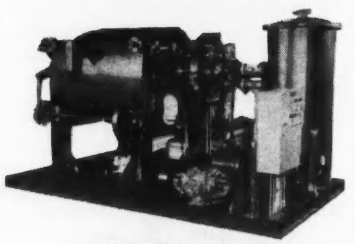

DEWATERER


COMPLETE PILOT PLANT


VAPORTIGHT HOODED DRUM


PLATFORM UNIT

THE EIMCO CORPORATION

SALT LAKE CITY, UTAH

Research and Development Division, Palatine, Illinois • Process Engineers Inc. Division, San Mateo, California
Export Offices: Eimco Building, 51-52 South Street, New York 5, N. Y.
BRANCHES AND DEALERS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

B-302

Check 4186 opposite last page

PROCESSING

History of pumps

Brochure of eight pages presents an interesting and informative account of the development of the pump in its various forms from ancient times up to the present. Applications of pumps to filtering processes are discussed. Tech data sheet T4 — T. Shriver & Co., Inc., Harrison, New Jersey.

Check 4187 opposite last page.

Faster, more complete dispersions obtained with efficient mill

Uses impact, turbulence, attrition, ultrasonics

Uses: Dispersing, emulsifying, and blending various materials in chemical, food, and allied industries.

Features: Impact, attrition, turbulence, and ultrasonic cavitation all occur in unit, resulting in faster, more complete homogenizations at minimum cost.

Compact mill stands 14 x 14", can handle from 100 to 400 gph

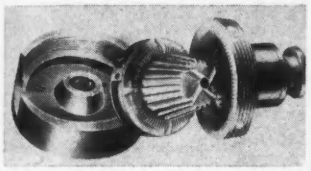
Production range is 100 to 400 gph. Machine is self-cleaning, simple to disassemble, and can be operated continuously.

Description: Known as the Jet Mogenizer, unit is available in either vertical or horizontal mounting in 1, 1½, and 2-hp sizes. Horizontal unit occupies 32x14″ floor space, weighs 200 lb. Vertical model stands 14x14″, weighs 150 lb. Either type can be mounted on casters.

Machine's rotor and stator

are designed to expose processed material to continuous hydrodynamic impulses. Spline arrangement is such that the fluid flow is converted from a constant rhythmic vibratory pattern into an intermittent variable one.

This causes sub-sonic effects and intensified turbulence. Violent interparticle attrition



Stator and rotor are disassembled in two simple operations in matter of seconds

follows as the fluid mass is impacted through restricted spline vents.

At peripheral velocity of 4500 fpm, the whirling particles vibrate at ultrasonic frequencies exceeding 20,000 cps as they are impinged on the sonic blade. At this frequency continuous cavitation is generated within the particles.

Particle size adjustment can be made while machine is operating. Simple locking device is notched for fixed settings. Mills can be made from various types stainless steel. Shaft seals are Teflon.

(Further information about Jet Mogenizers can be obtained from Buschman Products Inc., 369 Lexington Avenue, New York 17, N. Y.)

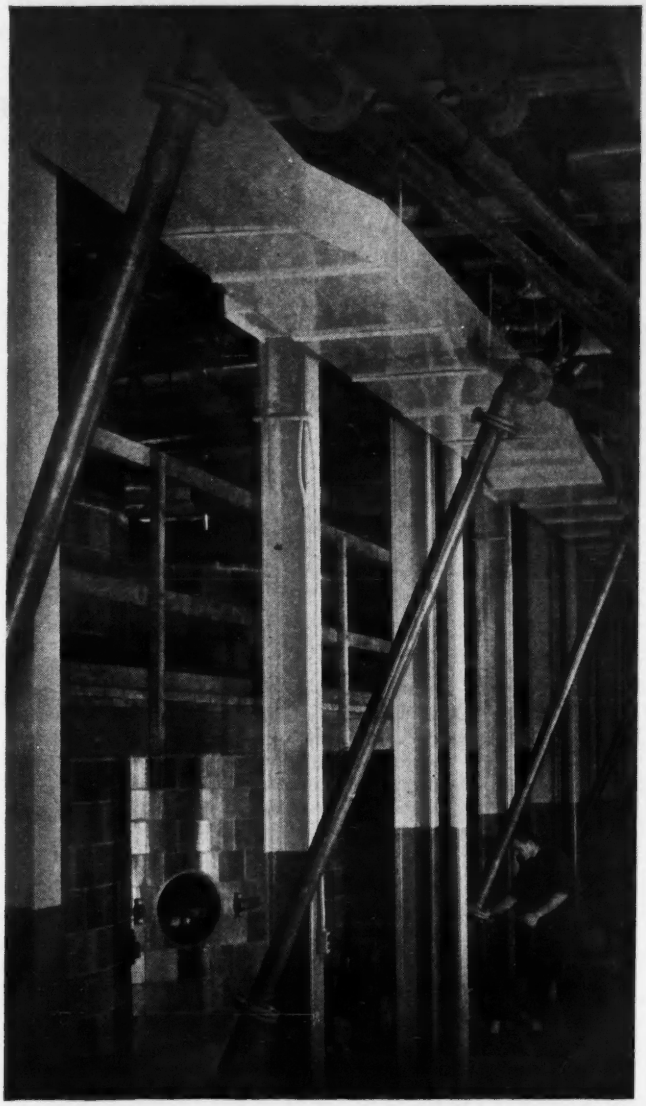
Check 4188 opposite last page.

Grit collecting, washing

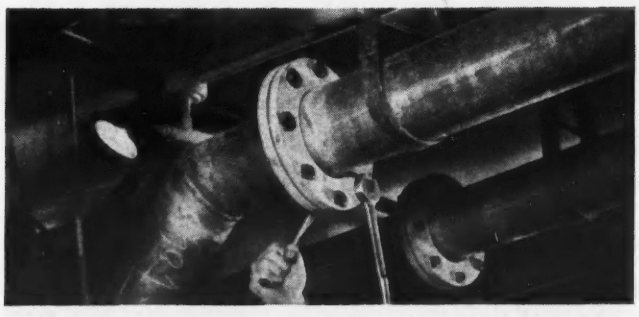
Bulletin of 28 pages, tab-indexed and three-hold punched for permanent retention, contains design data on seven types of grit collectors, two grit washers, and combination grit collector-mechanical screen. Detailed drawings and specifications are included. Book 2571 — Link-Belt Co., Dept. PR, Prudential Plaza, Chicago 1, Ill.

Check 4189 opposite last page.

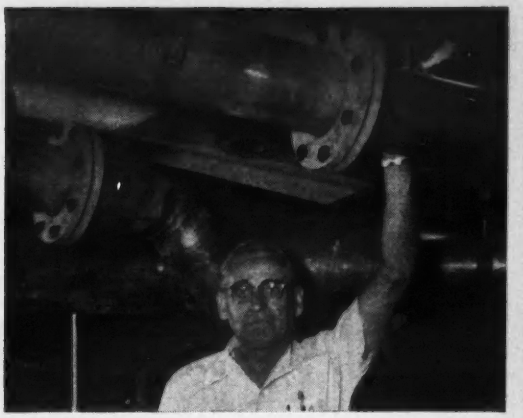
Copper tube for pipe lines cuts installation time 40% —gives superior service in paper pulp handling



COPPER TUBE USED to transmit paper pulp in the Crocker, Burbank & Co., Mill #5 at Fitchburg, Mass.



LARGE-DIAMETER copper tubes are joined by welding (note elbow) or by the flange type of connection.



WILLIAM G. DUNN of Crocker, Burbank & Co. says copper tubes for the process lines in paper-making plants offer many advantages over other piping materials. He uses Anaconda Copper Tube in sizes up to 10" I.D.

"Easy handling and installation are the biggest advantages of copper tube in our operation," says William G. Dunn, supervisor of sheet metal and piping for Crocker, Burbank & Co., paper manufacturers of Fitchburg, Mass.

"We estimate that copper saves us about 40% in installation time. Just the advantage of standard 20-foot lengths greatly simplifies our job, when you consider that we have runs up to 365 feet long. Also, because of the relatively light weight of copper tubes, we can do more fabrication and preassembly in our pipe shop than would be practical with heavier piping."

Meets corrosion problems. Copper tube lines are used to transmit paper pulp from beaters to pulp storage tanks and on to work boxes at the paper machine. In this service, copper does not contaminate the pulp and resists corrosion from the pulp solutions. Copper tube is also used to carry deionized water used in the paper-making process.

Your requirements. No matter how special your piping problems may be, it is quite possible that Anaconda seamless tubes may provide the solution. The American Brass Company offers the widest range of sizes in copper and copper alloys available to industry—from .032" O.D. to 26.875" O.D. Technical assistance is also available to help you determine the alloy best suited to meet your requirements. For such help or further information about Anaconda products, contact our nearest District Sales Office or write to: The American Brass Company, Waterbury 20, Conn.

5790

ANACONDA®

SEAMLESS TUBES

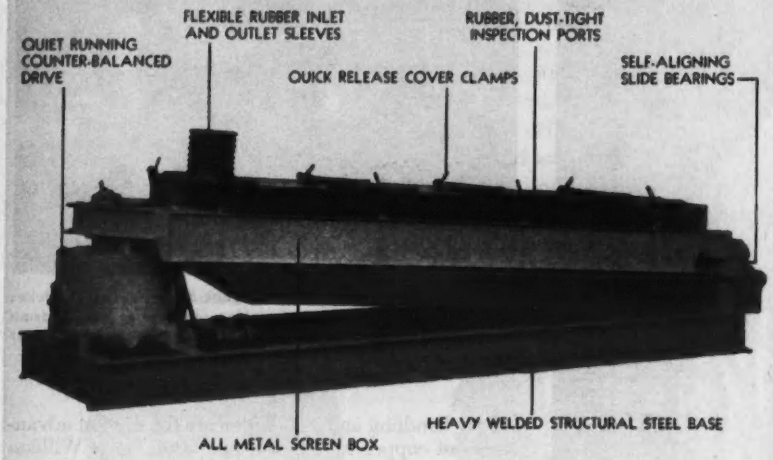
in Copper, Everdur®, Cupro Nickel, Brass

Made by

THE AMERICAN BRASS COMPANY

Check 4190 opposite last page

ROTEX SCREENERS GIVE PROFITABLE PRODUCTION!


QUIET RUNNING COUNTER-BALANCED DRIVE
FLEXIBLE RUBBER INLET AND OUTLET SLEEVES
QUICK RELEASE COVER CLAMPS
RUBBER, DUST-TIGHT INSPECTION PORTS
SELF-ALIGNING SLIDE BEARINGS
ALL METAL SCREEN BOX
HEAVY WELDED STRUCTURAL STEEL BASE

For over 40 years ROTEX Screeners have been widely used throughout industry. Today there are installations in the United States and over 25 foreign countries. Built for dependable service, ROTEX are long known for accuracy, capacity and operating economy.

ROTEX SCREENING ACTION:

The nearly level, gyratory motion, originated in ROTEX, conveys materials rapidly over screen surfaces with minimum vertical vibration or hop. This stratifies the material by particle size, rapidly passing undersize particles through the mesh openings. The results are clean separations of exacting accuracy coupled with high capacity. Designed for operating convenience, ROTEX Screeners pay for themselves by the economies they effect.

ROTEX WIDE SELECTION:

To meet your requirements: 25 standard models—one to five screen surfaces—many semi-standard and special models—sanitary and all-metal construction available.

Write for Bulletin 401 and information on your screening requirements. Our engineering staff will be pleased to cooperate with you.

ROTEX FEATURES
- Low head room
- Fast screen changes
- Dust-tite construction
- No screen blinding
- Dependable service
- Rugged construction

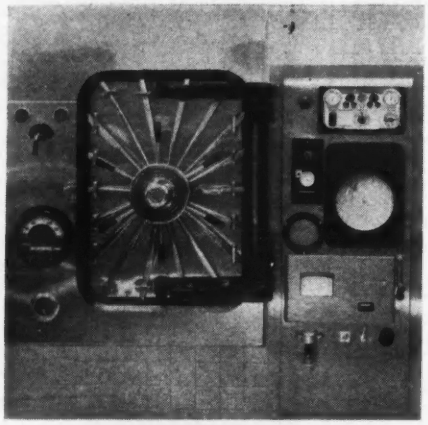
ROTEX® | **The Orville Simpson Company**
1246 Knowlton St., Cincinnati 23, Ohio

Check 4191 opposite last page

Avoids damage to products sensitive to heat or high humidity; compact unit . . .

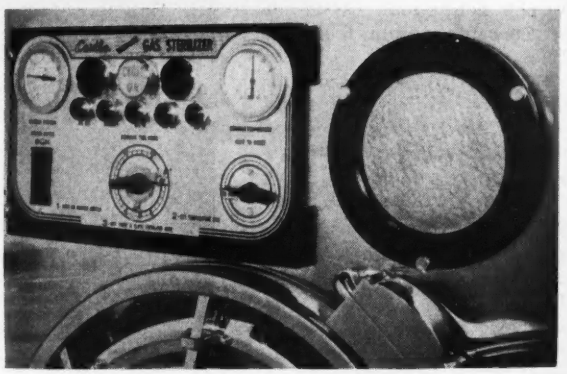
sterilizes efficiently with gas

Uses mixture of 20% ethylene oxide and 80% carbon dioxide; has automatic cycle control



◀ Automatic sterilizing equipment uses gas, permits sterilization to be performed at relatively low temperatures and optimum humidity conditions

Signal lights on control panel show exact phase of operation at any given moment ▼



Uses: Sterilizing rubber goods, thermoplastic materials, paper-wrapped packages, powders, plastic, and other industrial products that may be damaged by steam sterilization.

Features: Equipment permits sterilizations to be performed rapidly at low temperatures and optimum humidity conditions. Process is safe, automatic, and provides cycles that are fully reproducible in respect to time, pressure, temperature, concentration, and humidity.

Sterilizing agent is gaseous mixture consisting of 20% (by weight) ethylene oxide and 80% carbon dioxide.

Description: Equipment consists essentially of a sterilizing chamber and automatic controls for gas cycle. Controls may be recessed into wall next to chamber, or mounted in cabinet for remote control operation anywhere within 10 ft of the sterilizing chamber.

Once chamber is loaded and time, temperature, and humidity conditions pre-set on

control panel, operation is fully automatic. Chamber is evacuated and water vapor pulsed into chamber to produce optimum humidity conditions for kill. "Dwell" period of 30 minutes insures that load is permeated by the moisture. Gas is metered to chamber from 70-cu ft tank also controlled automatically for temperature and pressure.

When exposure period is complete, chamber is evacuated through vent line to building's exterior, and 25-27-in vacuum applied to remove remaining traces of gas.

Room air is then drawn through bacteria-retentive filters and past ultraviolet germicidal lamp before being introduced into chamber.

Cycle is thus completed and chamber returned to atmospheric pressure. Door may then be opened and contents removed. History of cycle is automatically recorded by two-pen pressure-temperature recorder on control panel. Signal lights on panel indicate exact phase of operation.

Equipment is available as a complete package in two basic sizes, with 100- or 200-cu ft sterilizing chamber. Existing equipment can be converted to the new system either for use with gas exclusively or steam and gas alternately.

As an example of non-destructive nature of process, rubber goods have been processed in the equipment for 365 hours with no noticeable deterioration. Sutural material exposed for 96 hours at 150°F also suffered no ill effects. Latex, plastic, and vinyl catheters were put through multiple runs for total of 290 hours without damage. The catheters were sterilized in two hours at 170°F.

Perhaps even more significant from an industrial viewpoint is that the high-vacuum and positive-pressure phases of the cycle result in more efficient penetration of plastic envelopes and paper packages. Even cardboard boxes are penetrated with relative ease.

(Sterox-O-Matic gas sterilizers are manufactured by Wilmot Castle Co., 1904 E. Henrietta Rd., Rochester, N. Y.)

Check 4192 opposite last page.

THE Raymond combination of *flash drying* and *fine grinding* in a single unit of equipment offers new speed and economy in the production of high grade chemicals, phosphate materials, pigments, clays, synthetic resins, filter cake and many manufactured products.

The rapid flow of finely divided and widely dispersed particles through a steady stream of heated air makes moisture removal almost instantaneous. The system is clean, dustless and automatic. The close control over fineness, dryness and temperature conditions assures a fine, dry, free-flowing finished material.

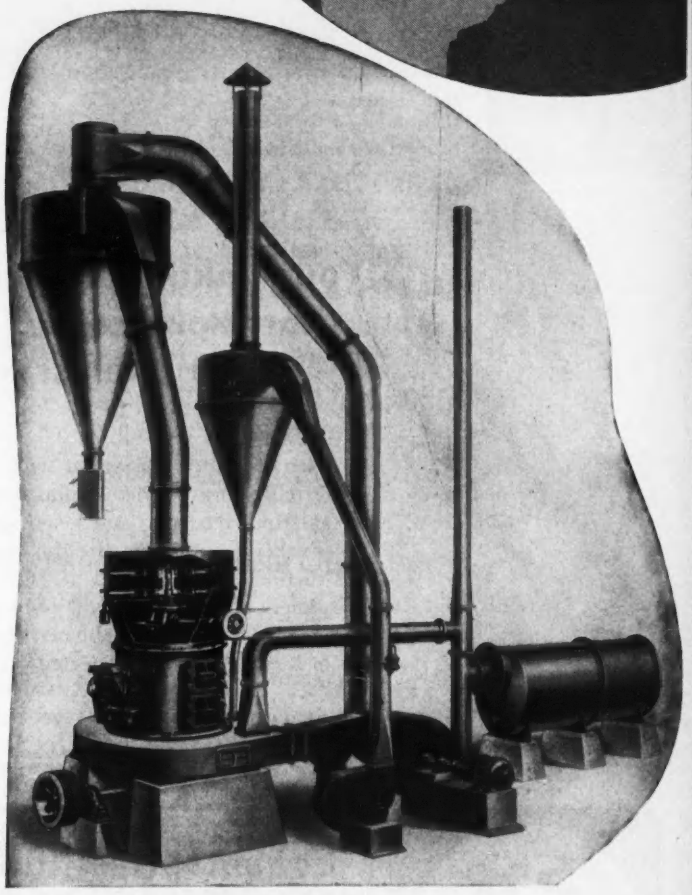
. . .

• Pneumatic feed devices maintain a maximum "load" on the mill under all conditions . . . a major factor in Raymond sustained high mill capacities.

• Throw-out attachments reject ungrindable impurities, insuring the delivery of uniform quality products.

• Integral whizzer separators give instant fineness control by one simple adjustment.

Whatever your pulverizing problem, be sure to check with us about this low-cost Raymond method of production.



RAYMOND Roller Mill with Flash Drying Accessories. Write for information on the Raymond Imp Mill and Cage Mill for drying-pulverizing and drying-disintegrating applications.

COMBUSTION ENGINEERING, INC.
Raymond Division
1317 North Branch St.
Chicago 22, Illinois
Sales Offices in Principal Cities
COMBUSTION ENGINEERING-SUPERHEATER LTD., Montreal, Canada

Check 4193 opposite last page

Heavy breaker construction for severe service

full enclosure for minimum product contamination.

Your flaking problem large or small is our interest too

The unit shown is fitted with internally spray cooled drum, direct gas fired feed pan and heavy duty breaker for uniform size flake production. As installed it is completely enclosed. This is only one of many flaking problems where G-B equipment was selected.

GOSLIN-BIRMINGHAM
MANUFACTURING CO., INC.
BIRMINGHAM, ALABAMA

FILTERS • EVAPORATORS
PROCESS EQUIPMENT
CONTRACT MANUFACTURING
including HEAVY CASTINGS

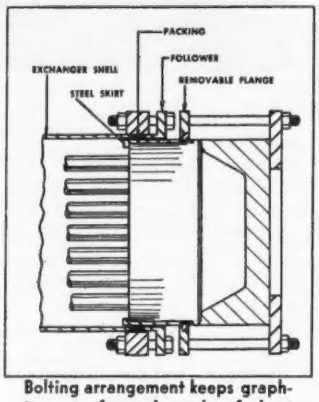
Check 4194 opposite last page

Improved floating head on impervious graphite heat exchanger

Keeps graphite under compression, more unit strength

Uses: Heating or cooling various corrosive liquids.

Features: Unit has improved floating-head design which keeps the impervious graphite in the floating end under constant compression. This gives the floating end of the exchanger greater strength. It also provides a more positive packing between the metal surfaces of the tube sheet skirt and the shell flange.



Bolting arrangement keeps graphite at forward end of heat exchanger in positive compression between steel plate

Description: Floating end of impervious graphite tube-and shell heat exchanger is composed of a graphite tube sheet, which accepts tubes of the exchanger, and a graphite dome, which directs the flow of the tube side fluid.

A steel skirt is placed around the tube sheet. This skirt is formed with a shoulder at the rear of the tube sheet, and a recess at the front.

Into this recess is positioned a split ring, which in turn accepts a retaining ring, and is bolted to the face plate, located at the extreme front end of the exchanger (see drawing).

Bolting arrangement keeps all of the impervious graphite at the forward end of the exchanger to be held in positive compression between heavy steel plate.

Exchangers are recommended for practically any corrosive service (except for a few strong oxidizing agents). Units are available in two standard tube pitches. This provides a selection of over 125 standard models. Capacities range from 7½ to 2300 sq ft of heat transfer surface.

(Impervite heat exchangers are product of Falls Industries, Aurora Rd., Solon, O.)

Check 4195 opposite last page.

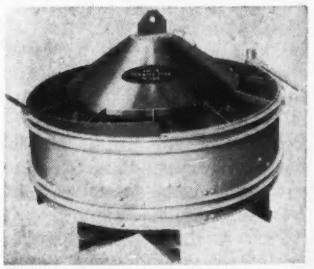
More thorough mixing up to 6 times faster with turbine mixer

Runs virtually vibrationless, is simple to install

Uses: Although originally designed for mixing concrete, unit should find wide-spread use in chemical, glass, fertilizer, food, and allied industries.

Features: Turbine mixer mixes up to six times faster than conventional units. Compact design permits mixer to fit into plants where only limited headroom exists. Unit operates virtually vibrationless, requiring no special installation.

Description: Turbine mixer has doughnut-shaped mixing drum with drive motor located in the center. Blades revolving in drum are positioned so as to braid the material being processed at rate of nine ft per sec.



Mixer's compact design and low headroom permits unit to be installed in practically any plant

Whipping action plus the live mixing area result in exceptionally fast mixing. Mixing is so thorough that most

materials are actually homogenized, according to manufacturer.

Power is transmitted to blades through series of spur-type reduction gears, enclosed and running in oil. Blades are pivoted in horizontal bearings and are under spring pressure. They are adjustable for proper clearance against both bottom and sides of mixing tank.

Entire top of mixing drum is open, facilitating charging from any angle. Semicircular door in bottom results in fast and easy discharge. More than one discharge door can be installed.

Units are available in 17½, 35, and 53 cu ft (dry batch) sizes. Mixers weigh 3100, 5500, and 7750 lb respectively Overall heights are 48, 56, and 59″.

Here is an example of what units have done in concrete block and pipe plants, where mixing cycles used to take from six to eight minutes per batch: Turbine mixer not only cuts time to 45 seconds, but permits aggregates, water, and cement to be charged simultaneously, rather than step wise.

(Turbine-type mixers are product of The T. L. Smith Company, 2835 N. 32nd St., Milwaukee 1, Wisconsin.)

Check 4196 opposite last page.

"I understand the basic patent rights are held by a computer out at Stanford University."

Submitted by Tom Blakley, Florida East Coast Fertilizer Co., Homestead, Florida.

NATIONAL *Leaders in Your Industry Have Selected "NATIONAL" as the Leader in the Field of* ® PERFORATED APRON-TYPE CONVEYOR DRYERS

Famous names among the manufacturers and processors of chemicals, fibers and allied products are proudly listed in the growing roster of "NATIONAL" customers.

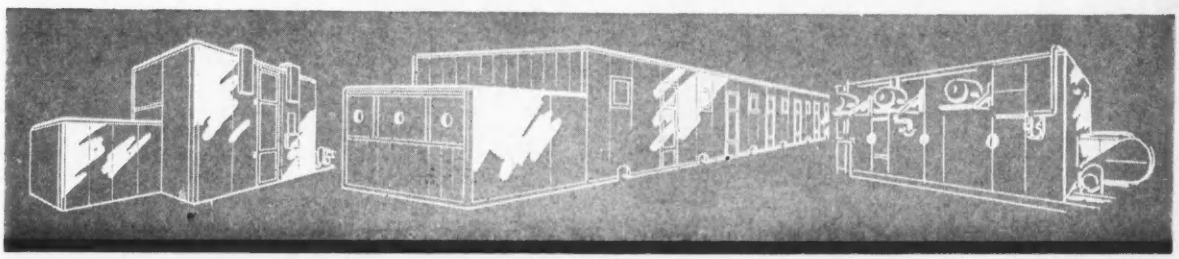
These companies, by their selection of "NATIONAL" Perforated Apron-Type Conveyor Dryers, have demonstrated their belief in the outstanding leadership which "NATIONAL" has earned in the design and construction of this and related types of drying and conditioning equipment.

AMERICAN VISCOSE CORPORATION
ARMOUR & COMPANY
THE PHILIP CAREY MANUFACTURING CO.
DAVISON CHEMICAL COMPANY
DIV. OF W. R. GRACE & CO.
DU PONT COMPANY OF CANADA (1956) LTD.
E. I. du PONT de NEMOURS & CO.
THE GENERAL TIRE & RUBBER CO.
CONGOLEUM-NAIRN, INC.
O. M. SCOTT & SONS CO.
A. E. STALEY MANUFACTURING CO.
AMERICAN ENKA CORP.
NATIONAL ANILINE DIVISION, ALLIED CHEMICAL & DYE CORP.
NATIONAL METAL EDGE BOX CO.
CANADIAN INDUSTRIES, LTD.
RADIO CORPORATION OF AMERICA
THE DOW CHEMICAL CORP.
CHEMSTRAND CORP.

Send for Literature or Representative, without Obligation

THE NATIONAL® DRYING MACHINERY COMPANY
LEHIGH AVE. and HANCOCK ST., PHILADELPHIA 33, PA.

New England Agent: JONES & HUNT, INC., Gloucester, Mass. • *Southern Agent:* F. W. WARRINGTON, Charlotte, N. C.
Cable Address: "NADRYMA"—W. U. Code



Check 4197 opposite last page

SKY-BLAST®

moves more air at less cost

...powerful roof ventilator with

NEW Smoke-Trip® Damper Opener

Because Propellair Sky Blast roof ventilators do not need the usual restricting weather cover which deflects and reduces air movement, they move more air at less cost. Fumes and heat are thrown high into the air, can't re-enter windows or turn downward to create roof maintenance problems. Their efficiency is not effected by wind velocity or direction. Weatherproof dampers open automatically when fan is started. Hot-dip galvanized after fabrication, Propellair Sky Blast ventilators are ruggedly built to give years of maintenance-free service. Available in sizes from 16" to 60" for 2820 to 78,800 CFM—PFMA Certified Ratings.

If desired, exclusive new Smoke-Trip heat-actuated venting device which automatically opens dampers in case of fire to exhaust smoke and fumes is available.

WRITE FOR BULLETIN NO. 680-C

R&M PROPELLAIR®

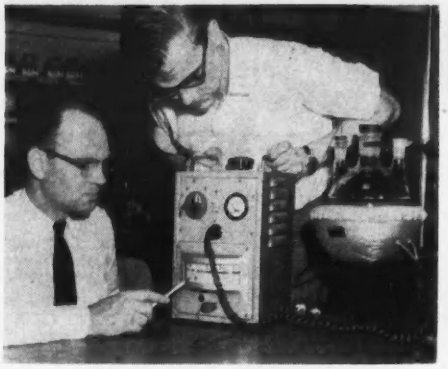
DIV. OF ROBBINS AND MYERS, INC.
SPRINGFIELD, OHIO

Certified Ratings (PFMA)

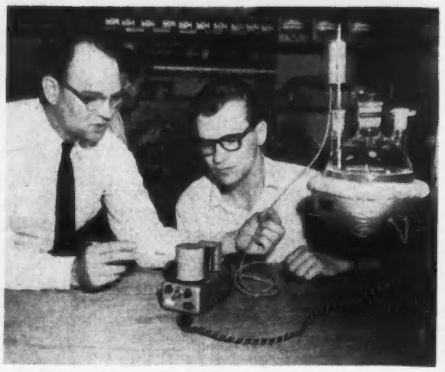
MAN COOLER VANEAXIAL TUBEAXIAL EXTENDED SHAFT

MOVING AIR IS OUR BUSINESS

Check 4198 opposite last page



▲ Here is the "Duenna," named after the Spanish chaperone. One of several sensing devices developed, instrument is a thermocouple-actuated controller for monitoring temperature and time



▲ Capacitance-actuated controller monitors position of liquid level. Easily used for controlling temperature, pressure, any liquid level which results in a change in capacitance, instrument is applied here to a thermometer

Small, low-cost, electronic control units watch time, pressure, temperature — all the routine jobs in the laboratory

'Robot Chemists' increase efficiency of research worker

Uses: Eliminating many monitoring procedures. Instruments may be part of a solution to reduce the frustrating, time-consuming, routine monitoring necessary in any laboratory.

Features: "Robot Chemists" have been developed to increase efficiency of research workers by carrying out distillations, making measurements, reading thermometers. Instruments can be used as individual units or combined in complex groupings for controlling temperature, pressure, liquid level, and foam level of the reaction, thus allowing chemist to leave his apparatus for extended periods, over night, . . . or even over the week-ends. Auxiliary devices are provided to sense potential failures in any associated equipment, thus making it practical to leave laboratory operations unattended. Instruments operate on 110v AC and 20-25 psi air pressure, where needed.

Description: Instruments are small, low-cost ($150 to $400, depending on instrument), light-weight electronic units designed to watch time, pressure, temperature, foam level, liquid level, and other variables. As these instruments perform their duties of monitoring, they automatically turn on and off other devices which perform any mechanical operations required. These auxiliary operations can be the cooling or heating of a chemical reaction, changing a liquid level, or increasing or decreasing vacuum or pressure.

'Therm-O-Watch'

Called a "Therm-O-Watch," one of the instruments has a small electronic brain which clips onto a mercury thermometer or manometer and converts it into a temperature or pressure regulator. Actually a capacitance-actuated controller for monitoring the position of a liquid column, instrument is a small oscillator. When oscillator head is clipped onto the thermometer, mercury column actuates an amplifier unit and hermetically sealed relay. Thermometer is thus converted into a thermal regulator controlling any other apparatus used in the operation. With a standard thermometer sensitivity is equivalent to 0.4 to 0.6°C.

In operation, instrument can be attached to any standard glass thermometer. Once control point has been determined, controller will control heat input,

or other variables, to apparatus so as to maintain position of liquid column. Needless to say, the column need not always be a column of mercury in a thermometer or manometer; any metallic liquid level can be used.

'Duenna'

"Duenna," named after the Spanish word for chaperone, is another of the several sensing devices developed. Instrument is a thermocouple-actuated controller incorporating an easily adjusted galvanometer, timer, heavy-duty relay, powerstat, and electronic circuits for duplex controlling of temperature and reaction time in glass flasks, pressure bombs, rocker bombs, and other apparatus. By monitoring temperature and time, "Duenna" thereby keeps the reaction from getting out of control. Another model of the instrument incorporates an auxiliary circuit for use with mercury thermoregulators to control rate of distilling or any other similar operation. Five interchangeable meters cover ranges 0 to 500°C.

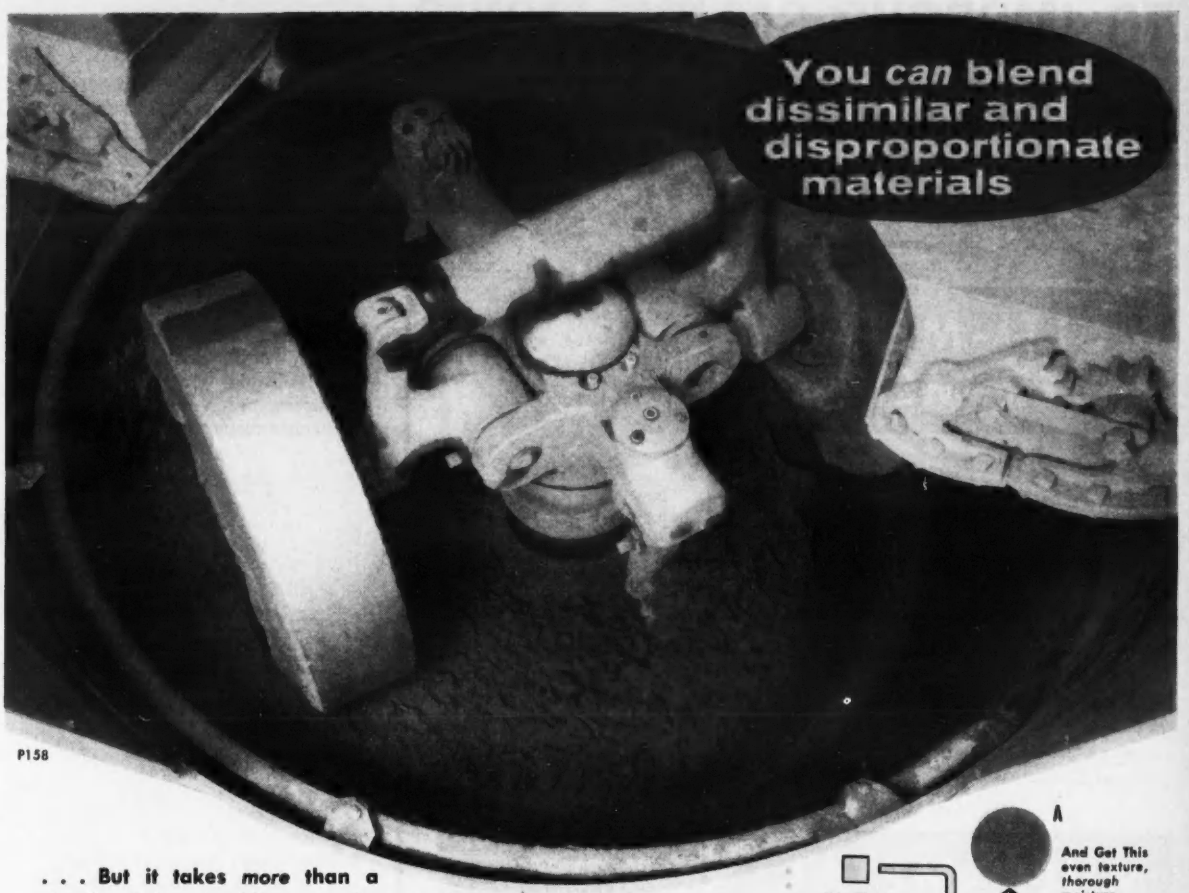
'Pot Lifter'

A third building block for control of laboratory reactions is a pneumatic "pot lifter." This instrument automatically raises and lowers heating and cooling devices and other equipment at direction of one of the other instruments.

Main value of the control instruments for the laboratory is freedom that will be provided for the researcher from more of the tedious jobs. Results in laboratories where over 200 of these so-called "Robot Chemists" are used indicate that the efficiency of the research worker can be greatly increased. By supplementing manpower with mechanical, electrical, and pneumatic power, the researcher is able to devote more of his time to the creative aspects of his work.

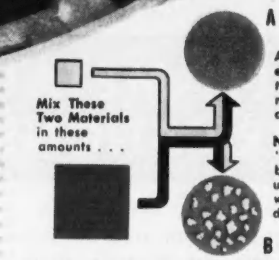
("Robot Chemists" are products of Instruments for Industry Research, 108 Franklin St., Cheltenham, Pa.)

Check 4199 opposite last page.



. . . But it takes *more* than a simple stirring, tumbling or agitator action.

In the Simpson Mix-Muller you get a unique three-way kneading, smearing, spatulate action. Materials are not merely stirred or tumbled together. It's an intensive and controlled *mulling* action which eliminates balling, breaks up agglomerates and actually *coats* one material with the other. Dispersion of moisture, binders or carriers is thorough, uniform and quickly accomplished. You get a mix that *stays* mixed, one that is unaffected in either storage or transit.


A
Mix These Two Materials in these amounts . . .
And Get This even texture, *thorough* moisture dispersion
Not This "Hot spots", balling, uneven and *wasteful* dispersion.
B

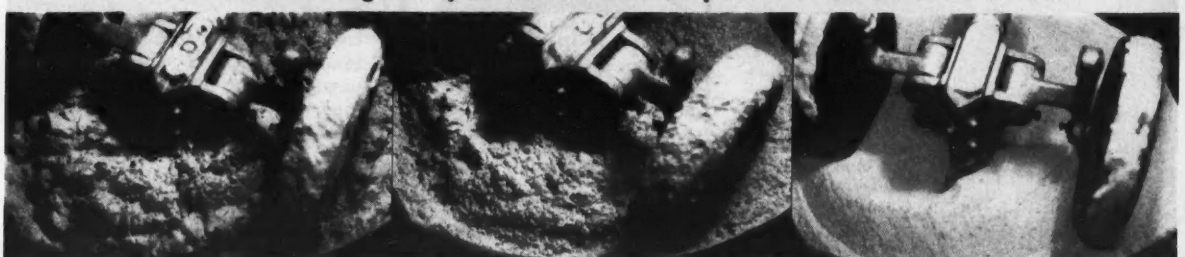
Here's how *controlled mulling* works:
Diagram shows comparative results of blending a minute amount of one material with large amount of another material in (A) MIX-MULLER and (B) conventional mixer. Savings in raw material, reprocessing time and quality of finished product are the outstanding *rewards* of mulling your product.

Want proof? Write for details on a confidential mulling survey on your own product . . . conducted under strictest laboratory conditions. Or write for literature.

SIMPSON *MIX-MULLER* DIVISION

NATIONAL ENGINEERING COMPANY
640 Machinery Hall, Chicago 9, Ill.

HOW MULLING gives you controlled dispersion for better blends:



GOING: Mix is wetted, dispersion of coating media begins as lumps form.

GOING: Smearing, *spatulate* action breaks up lumps as mulling action disperses moisture.

GONE: Agglomerates almost gone as blending nears completion. Mix is homogeneous, thorough.

Check 4200 opposite last page

TO IMPROVE SOLIDS-LIQUID SEPARATION PROCESSES

Consider

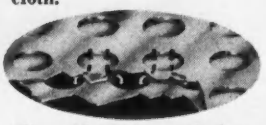
MULTI-METAL FILTER MEDIA

Wire Cloth and Filter Cloth in all alloys, and every degree of density down to 400 mesh and in all weaves.

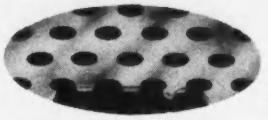
"Neva-Clog" perforated sheet metal medium functions on edge filtration principle.

"Mykro-Pore" electrodeposited filter medium in pure nickel, with round or slotted holes; wide range of opening sizes, hole patterns, open area ratios and thicknesses.

"Multibraid" (magnified); dense, strong, woven filter cloth.



"Neva-Clog" (magnified to show flow); perforated sheet metal filter medium.

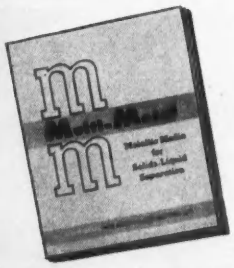


"Mykro-Pore" (magnified cross-section); electrodeposited filter medium.

MULTI-METAL FABRICATIONS

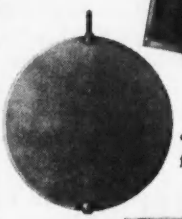
A complete, comprehensive and versatile service in converting filter media into filtration or other processing components or complete units:

Filter leaves for all pressure and vacuum filters; screens for plate and frame presses; tubular filter elements; strainers; vibrating screens; baskets; hoppers; cylinders; elements for dryers, catalyst units, washers, mixers, etc., and complete apparatus or machinery.

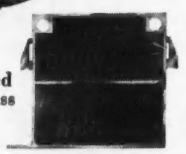


Catalog 57 gives helpful, practical information on Multi-Metal research, engineering and product services for better methods and means of solids-liquid separation. Write for a free copy.

"Rim-Lok" leaf for vertical or horizontal filters.



"Sweetland" filter leaf.



"Multi-Plate" fabricated filter press plate.

Elements for gas stripping process.

Vibrating screen disc.

MULTI-METAL WIRE CLOTH CO., INC.

1356 GARRISON AVENUE • NEW YORK 59, N. Y.

Check 4201 opposite last page

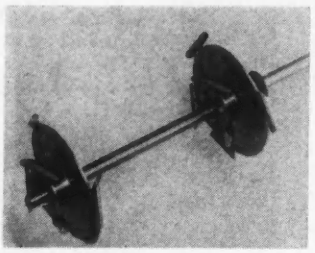
LABORATORY

Mixes, whirls, stirs — stirring paddle can insure dispersion

Combination of forces creates intense mixing

Uses: As stirring paddle for laboratory needs.

Features: Paddle not only combines centrifugal force, suction, and shearing action with counter whirl, but also promotes high velocity of flow to insure dispersion.



Conical tubes on stirring paddle mix, whirl, and disperse media

Description: Paddle consists of number of small conical tubes mounted around periphery of a set of discs. One set is fitted to bottom of vertical rotating shaft. Other sets are fitted above initial paddle and on same shaft. Conical tubes are set at such an angle that controlled turbulence in an upward and downward direction is created.

("Impelator" stirring paddle is product of Palo Laboratory Supplies, Inc., 81 Reade St., New York 7, N. Y.)

Check 4202 opposite last page.

Drainage system specs

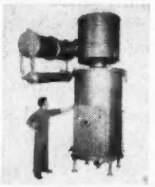
Specifications for lead chemical laboratory drainage systems are contained in four-page bulletin. Detailed drawings of suggested methods of installing lead waste lines for wall laboratory tables and center laboratory tables with center troughs and end sinks are included. Lead building construction Bul 3 — Architectural Dept., Lead Industries Association, 60 East 42nd St., New York 17, N. Y.

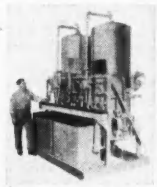
Check 4203 opposite last page.

Small roller bearings . . . some as tiny as the period at the end of this sentence are produced by Miniature Precision Bearings, Inc., of Keene, N.H. with an assist from Barnstead Distilled Water.

Even Roller Bearings *ROLL* Better With BARNSTEAD Distilled Water

Barnstead Stills provide a reliable source of *purest water* in either laboratory or production quantities. At Miniature Precision Bearings, Inc., this is what they say: "This water Still is used in our vital laboratory work on the metallurgy of metals in our bearings and tools. A great deal of time is spent in analyzing the causes of bearing failure. . . . Dust for example, is analyzed optically and chemically. . . . Naturally, the purest distilled water is needed for much of this work and Barnstead equipment fills this need nicely."





DISTILLED OR DEMINERALIZED?

Whatever your requirement . . . you can get exactly what you need from Barnstead . . . Only Barnstead makes both . . . Stills and Demineralizers for all Pure Water requirements. Write for literature today.

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STILL & DEMINERALIZER CO.

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66 Lanesville Terrace, Boston 31, Mass.

FIRST IN PURE WATER SINCE 1878

Check 4204 opposite last page

Cobalt-60 irradiator handles nine samples with safety

Permits experimental irradiation processing

Uses: As source of gamma flux for experimental irradiation processing.

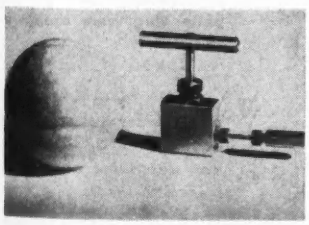
Features: Laboratory cobalt-60 irradiator will process up to nine specimens with a maximum level of 800,000 roentgens per hour. Any specimen can be quickly and easily removed or inserted with no irradiation exposure hazards.

Description: Laboratory irradiator is about three ft high by two ft wide and two ft deep. It weighs about 5000 pounds and requires no electrical supply, cooling, or other utilities. Provisions are made for introducing any atmosphere to samples during irradiation. Electrical leads to samples permit heating, temperature, measurements, etc.

Source of radiation is approximately 1300 curies cobalt-60, shipped already installed in unit. Lock is provided to prevent tampering by unauthorized personnel. Eight of nine specimens irradiated can be up to 8″ long by 1″ wide by ½″ deep. Ninth specimen can be 8″ long by 1⅝″ diameter, cylindrical in shape.

("Hotpot" cobalt-60 irradiator is product of Picker X-Ray Corporation, 25 South Broadway, White Plains, N. Y.)

Check 4205 opposite last page.



Tiny valve . . .

. . . designed for use under conditions of high pressure could fit inside a tennis ball. Midget valve is to be used with 1/16″ tubing and will handle up to 15,000 psi. Available in several materials, valve provides a means for minimizing system hold-up.

(Midget valve is product of High Pressure Equipment Co., Inc., 1222 Linden Ave., Erie, Pa.)

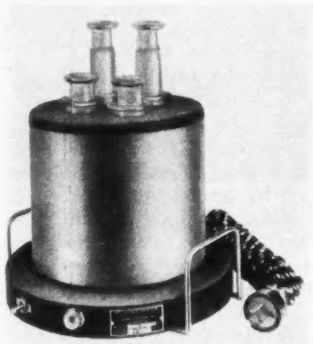
Check 4206 opposite last page.

Gives moisture content of solids readily

Measures water volume volatilized from sample

Uses: Determining moisture content of solids.

Features: Moisture analyzer uses syringe method for determining water content. Time for complete analysis is said to be shorter than other methods.



Moisture analyzer measures water content in solids

Description: Developed for measuring moisture content of nylon molding powders, moisture analyzer is readily adaptable to analysis of similar compounds with same relative moisture content.

Instrument measures volume of water vapor volatilized from particles of specimen just below melting point. After being volatilized, vapor is trapped in syringe. Increased volume of vapor forces piston to rise in manner proportional to water content of original solid or granular specimen.

(Model 1 Volatimeter is product of Manufacturers Eng. and Equip. Corp., Hatboro, Pa.)

Check 4207 opposite last page.

EASTERN PORTABLE MIXERS

especially designed for small batch processes

offer . . . precise mixing results with long term cost savings

Eastern Portable Mixers are especially designed for dependable, low cost service in small batch processes. Where fixed mounted installations are not required, Eastern's Portables offer greater versatility, ease of handling, and long term cost savings.

Speeds of 420, 1125, and 1725 R.P.M. rated from 1/20 to 3 H.P. are standard, with variable speed and air-driven models also available. Motors in all standard types can be supplied in semi-enclosed, totally-enclosed, or explosion-proof construction. Shafts and single or dual propellers are available in a choice of alloys for all service requirements. New optional ball-swivel clamp as illustrated, permits easy adjustment of mixer position in tank.

For a personalized analysis of your mixing problems, send details to Eastern engineers. A recommended solution will be furnished promptly and without obligation. For a helpful guide to mixing fundamentals, write for "Handbook of Fluid Mixing."

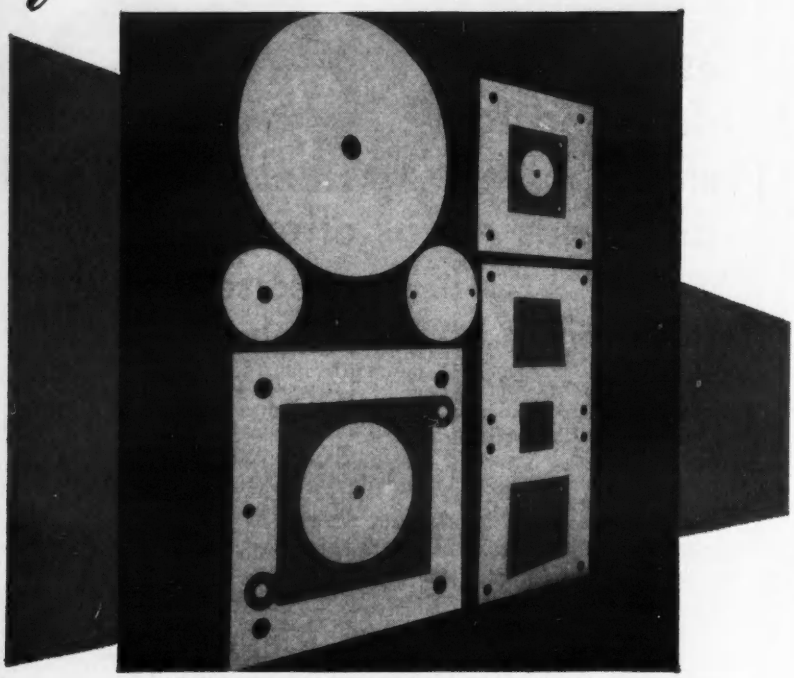
NEW PORTABLE MIXER BULLETIN

Eastern's improved line is included in the revised Portable Bulletin No. 530-A.

Eastern INDUSTRIES, INC.
MIXER DIVISION
Regent Street
East Norwalk, Conn.

Check 4208 opposite last page

Exceptional clarity of filtrate obtainable.



E-D filter papers cut to exact requirements of your filter. Above are a few of the most widely used sizes and shapes.

In most cases, E-D filter papers can obtain greater clarity of filtrate than is possible with any other filter media.

First, because of their fine porosity. Second, because superior raw materials and rigid production controls result in papers of unmatched purity and quality.

In addition, leading filter manufacturers recommend the use of E-D filter papers as

Time saving: Little or no recirculation is required when used with filter aids.

Labor saving: Easy to handle, easy to dress, easy to remove.

Versatile: Can be used with equal efficiency over filter cloth, metal screens, or perforated plates.

E D *The Eaton-Dikeman Company*

FILTERTOWN
MT. HOLLY SPRINGS, PENNA.

FREE! *Write for new Catalog 357 showing extensive use of industrial filter papers in plant applications.*

Check 4209 opposite last page

Automatically performs continuous analyses

Keeps visual record of titration results

Uses: Continuous analysis of a chemical process during manufacture by titration means.

Features: Automatic titration analyzer continuously presents visual record of analytical results.

Description: Analyzer consists of two separate units. One is chemical unit, containing array of glass vessels controlled by automatically operated taps. Second is electronic control unit which determines precise sequence of operation.

Unit is connected to main plant stream. At regular intervals a measured quantity of solution manufactured is fed to reaction vessel. After dilution with water, titration with standard reagent begins and continues until solution has been completely neutralized. Amount of reagent used is determined by an "electric eye" which seeks and finds reagent level. Volume used is thus recorded. Reaction vessel empties itself and entire process begins again.

Time cycle of titration can be varied from once every three minutes to once every half hour. Unit is designed to operate day and night without attention, other than a routine weekly inspection.

(Titromatic analyzer is available from Instrument Div., Robertshaw-Fulton Controls Company, 2920 N. Fourth St., Philadelphia 5, Pa.)

Check 4210 opposite last page.

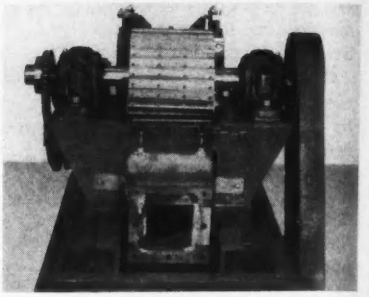
Toepler pump, float valve

Manufacturer's version of Urry-Toepler pump and mercury float valve for users of high-vacuum glassware are described and illustrated in two-page data sheet. Bul, October 1957 — Delmar Scientific Laboratories, 4701 W. Grand Ave., Chicago 39, Ill.

Check 4211 opposite last page.

CUT PLASTIC PELLETS

OF UNIFORM SIZE WITHOUT FINES OR LONGS



Taylor-Stiles Plastic Pelletizers produce pieces cut with extreme accuracy, of uniform size, and with practically no fines or feathers. Production rates of 10 tons an hour are common.

Two types of machines are available. The sheet stock cutter slits the sheet stock into strips and then cross cuts into pellets. The rod type cutter dices rods directly as they come from the extruder.

Both types of Taylor-Stiles pelletizers are used by this country's leading plastics manufacturers for pelletizing from sheets or rods.

Send today for four page brochures No. 210 and No. 213 illustrating and describing our pelletizers for sheets and rods.

TAYLOR-STILES Company
CUTTING MACHINES & KNIVES

20 Bridge Street **Riegelsville, N.J.**

Check 4212 opposite last page

Only slight pressure is needed to close this valve

Polyethylene check valve is unbreakable

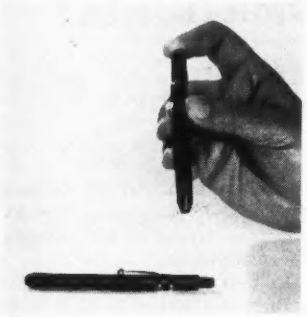
Uses: As check valve in vacuum line to filter flasks.

Features: Only a very low pressure is needed to cause check valve to seal.

Description: Small check valve measures only 2⅛″ in length and ⅝″ in diam, overall. Polyethylene, tubing connections are serrated, tapering from ⅜ to ¼″. If necessary, the non-breakable check valve may be taken apart for cleaning by warming first in hot water. Sealing disc is of gum rubber, providing a positive seal with only a slight pressure. Arrow on outside of valve indicates direction of free flow.

(Polyethylene check valve is product of Pioneer Plastics, 2360 W. Dorothy Lane, Dayton 9, Ohio.)

Check 4213 opposite last page.

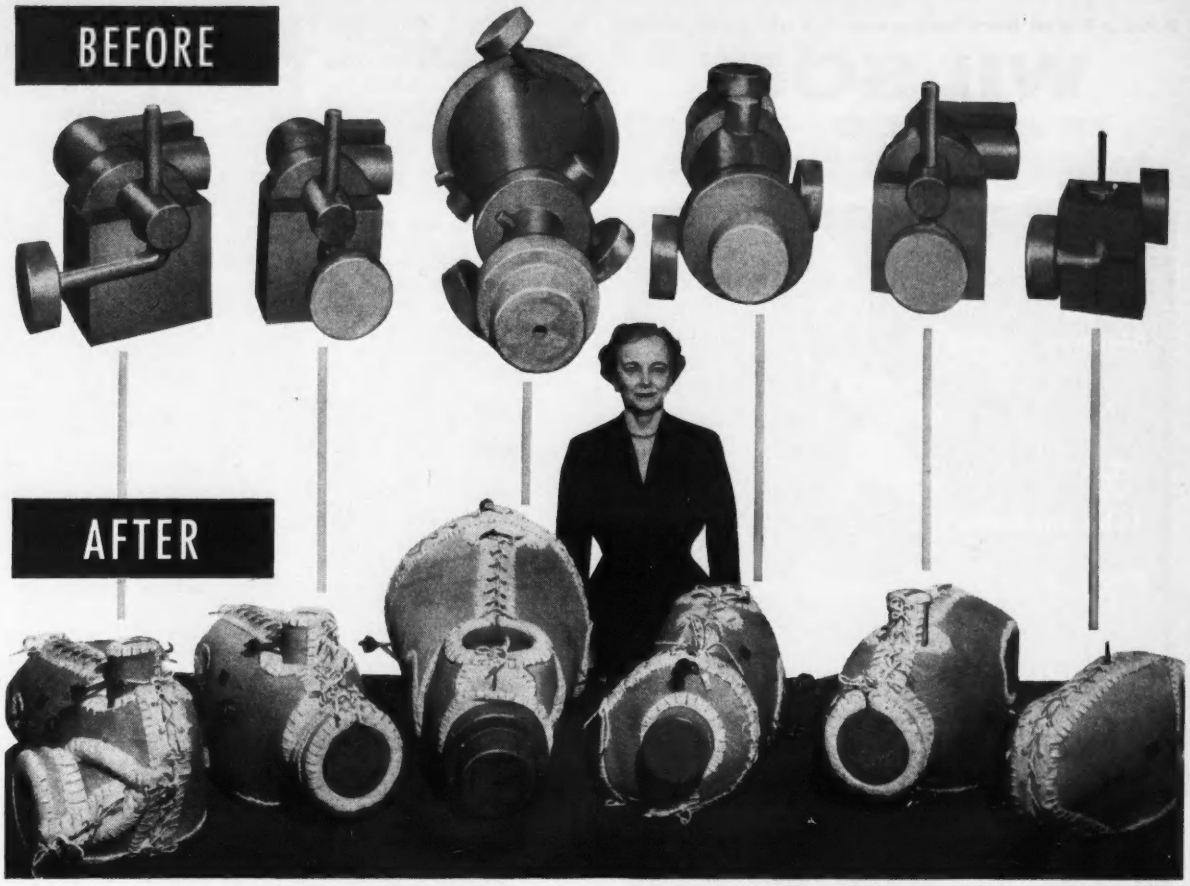


Magnetic tweezer . . .

. . .is helpful in handling small parts or particles that are capable of being magnetized. It can be instantly magnetized and demagnetized. Pressing of top plunger magnetizes tip. Releasing of plunger demagnetizes it. Energizing magnet should last indefinitely.

(Mag-Tweez is product of Orbit Industries, Box 666, Reseda, California.)

Check 4214 opposite last page.



Before and after pictures show various elements (all of unusual shape) for use in a pilot plant . . . without and with specially tailored heating mantles.

GLAS-COL MAKES HEATING MANTLES FOR DIFFICULT, COMPLICATED SHAPES

specialists in production, pilot plant, and laboratory heating problems

If you have a complicated heating problem . . . an application that calls for a heating mantle of unusual and difficult shape, it will pay you to get in touch with Glas-Col.

Glas-Col has tailored thousands of electric heating mantles for special applications . . . many of them even more complicated than those shown above. Glas-Col mantles are built in three different types of fabrics . . . glass-fabric for applications to 450°F . . . quartz-fabric for applications to 1200°F . . . and "R" fabric for applications to 1200°F which will be subjected to heavy, punishing usage.

For additional information relating to special or standard heating mantles, contact Glas-Col Apparatus Company, Dept. CP, 711 Hulman Street, Terre Haute, Indiana.

GLAS-COL — the world's largest manufacturer of heating mantles

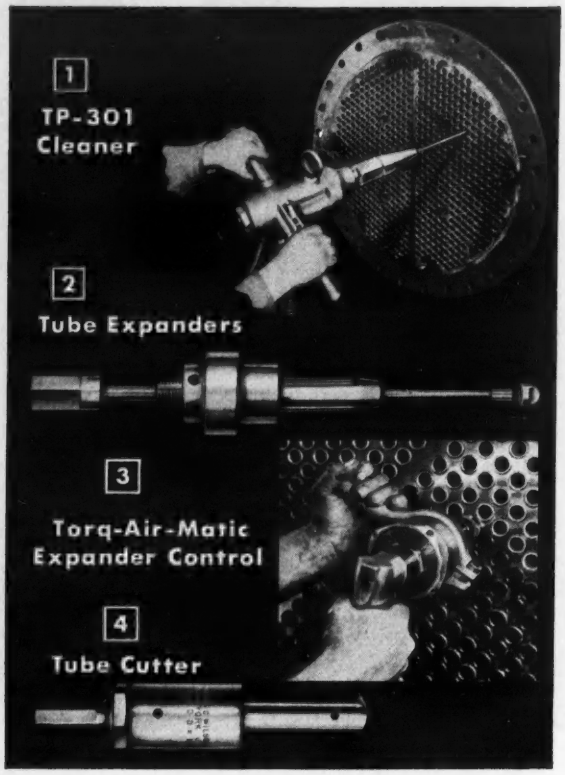
ELECTRIC HEATING MANTLES

Trademark Registered U. S. Patent Office
U. S. Patents—
2,282,078
2,739,220
2,231,506
2,739,221

Check 4215 opposite last page

Keep Heat Exchangers on stream with

WILSON TUBE MAINTENANCE TOOLS



1 Heavy-duty TP-301 Cleaner is a positive air-driven, hollow rotary shaft, drill type tool. Tube is scavenged with air or water while cleaning.

2 Wilson Models 41 and 44 Tube Expanders incorporate an improved, adjustable ball bearing thrust collar and are designed for efficient, easy rolling and maximum roll length adjustment for various tube sheet thicknesses.

3 New Wilson Torq-Air-Matic is the first and only air-driven tube expander drive that accurately controls tube expansion by directly measuring torque output at the mandrel.

4 Wilson tube cutter is easy to use and does a fast job. Cutter sizes and shanks available to meet all heat exchanger requirements.

Write today for your copies of Wilson Tube Cleaner catalog No. 77 and Wilson Tube Expander catalog No. 88. TW-661

Representatives in principal cities
THOMAS C. WILSON, INC.
21-11 44th Ave., Long Island City 1, N. Y.
Cable address: "Tubeclean", New York

WILSON
TUBE CLEANERS • TUBE EXPANDERS

Check 4216 opposite last page

Photo 1. Pigments are added to ball mill below hood. Note complete absence of dust. Bags are then released by operators and carried up through ducting to main dust collector housing

Photo 3. Bags are continuously ejected from collector's hopper into mobile bin through rotary valve. When full, bin is hauled by truck to incinerating area

Photos By CP Staff

Rust-Oleum Corp., obtained a two-fold benefit with a dust control system installed to service dry-pigments loading room

COLLECTOR ENDS DUST NUISANCE AND DISPOSES OF BAGS AUTOMATICALLY

THEODORE W. WETT, Assistant Editor
With **DONALD FERGUSSON,** Vice President
Rust-Oleum Corp., Evanston, Ill.

Problem: Dust was a nuisance in third-floor dry-pigments loading room at Rust-Oleum. Plant makes use of gravity flow for many operations so pigments were added to ball mills from third floor directly above mills. Empty pigment bags were disposed of by packing them in boxes or barrels and hauling them down the service elevator to ground floor. Since elevator was also used to transfer raw materials and intermediates, by tying it up with bag hauling, a bottleneck was formed.

In manufacture of protective coatings and finishes at Rust-Oleum, fish oil is processed to remove odor and to improve drying characteristics. Pigments are then dispersed in the oil in ball mills. A variety of pigments are used including earth pigments such as red (iron) oxide, magnesium silicates, and titanium (dioxide) types; and dry colors such as chrome greens, oranges, and yellows.

Rust-Oleum's management wanted to eliminate severe dusting which took place during pigment addition. About 400 bags a day, mostly of 50-lb size, were handled, so a more efficient means of bag disposal was also a consideration.

Solution: In September 1953, company installed a dust collection system with unique feature of also automatically disposing of empty bags.

Unit is essentially a cloth filter. In the collector, dust-laden air collected from individual bag-dumping stations is passed up through cotton sateen tubes closed at upper end and supported by hangers. Dust is trapped in tubes and periodically shaken down into a hopper by built-in shaker mechanism. Air passes through tube wall, which removes 99% of dust, and is subsequently exhausted.

In utilizing this system, pigment bags are opened in fume hood (Photo 1). Bulk of pigment falls to ball mill which is connected to bottom of hood by a telescope duct. Dust and empty bags are drawn up through collector's duct system to main housing (Photo 3) where bag is re-

moved from air stream by a baffle and dropped to a hopper. Dust-laden air is then filtered, and recovered pigment dropped to a separate hopper. Bags are continuously ejected from hopper to mobile bin (Photo 2) by means of a rotary discharge valve. When bin is full it is hauled by truck to incinerating area where bags are burned. Eventually, bags will be fed directly from hopper to an incinerator.

Unit has a capacity of 7068 cfm. Inspection walkway permits easy inspection of tubes without removing them. Each tube is an independent cell which can be replaced in a few minutes if necessary.

Results: Dust problem has been eliminated. In fact, approximately 200 lb of pigment are recovered every week and can be used in certain operations. Since bags are automatically disposed of, there is no longer any need to tie up the elevator to haul them to main floor. Valuable working time that was formerly used to pack bags in boxes for dumping is utilized now to increase production.

Except for a few minor repairs, collector has been trouble-free since installation four years ago.

(Dustube collector system was supplied by Wheelabrator Corp., 615 S. Byrkit St., Mishawaka, Ind.)

Check 4217 opposite last page.

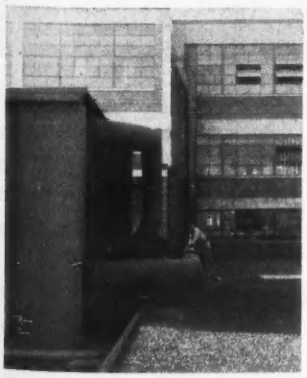


Photo 3. Duct carries pigment-laden air and bags from dumping stations (top floor background) to collector (left)

Fluoroflex®-T Molded Bellows

LAST FAR LONGER

because they're made of TEFLON® at its best

Molded, not machined for continuous, undamaged grain structure

Special compound developed for maximum flex life

High density, non-porous

Chemically inert, universally useful, non-contaminating

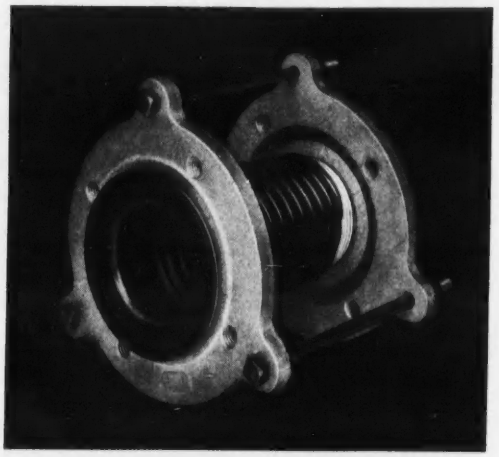
BELLOWS MOLDED OF FLUOROFLEX-T offer at least 20 times the flex life and twice the burst strength (after flexing) of ordinary bellows machined from Teflon. At long last, you have chemically inert flex joints with predictable service life, even under extreme conditions.

FORGET ABOUT SUDDEN FAILURES — COSTLY DOWNTIME. One big user severely flexed Fluoroflex-T bellows 20,000,000 times...abandoned the test without a failure.

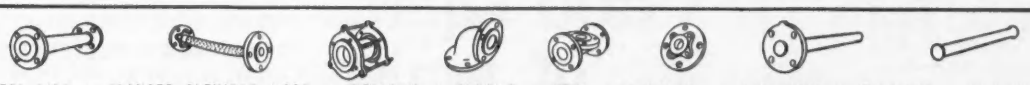
Even at *400°F.*, tested through *maximum* expansion range under full *dynamic* working pressure . . . bellows went through 100,000 cycles before tests were discontinued . . . still without failures.

NEW BULLETIN TELLS MORE — gives operating and construction data. Write RESISTOFLEX CORPORATION, Roseland, New Jersey. Southwestern Plant, Dallas, Tex. Western Plant, Burbank, Calif.

® Fluoroflex is a Resistoflex trademark, reg., U.S. pat. off.
® Teflon is DuPont's trademark for TFE fluorocarbon resins



Complete systems for corrosive service **RESISTOFLEX**



LINED STEEL PIPE • FLANGED FLEXIBLE HOSE • BELLOWS • ELBOWS • TEES • REDUCERS • DIP PIPES & SPARGERS • LAMINATED PIPE

Check 4218 opposite last page

He's carrying enough ULTRALITE to insulate 600 sq. ft. of tank!

. . . and in short order, that 600 sq. ft. roll of ULTRALITE glass fiber insulation will be permanently in place on the tank. Resilient ULTRALITE simply *wraps around* tanks, vats and vessels . . . takes only a fraction of the time required by the bat-at-a-time method. ULTRALITE "hugs" tanks closely, eliminating cracks and fluing action, and its K factor is only .27 at 70° mean temperature.

It all adds up to this: with ULTRALITE you can do a "deluxe" job—including metal weatherproofing sheets—*at no extra cost!* For details, write direct or—

CALL YOUR G-B INSULATION DISTRIBUTOR (LISTED IN ADJOINING COLUMN)

For more information on product at right, specify 4219 see information request blank opposite last page.

GUSTIN-BACON *Manufacturing Company*

Thermal and acoustical glass fiber insulations • Pipe couplings and fittings • Molded glass fiber pipe insulation

G-B ULTRALITE DISTRIBUTORS

(See ad on facing page)

ALBUQUERQUE, Mt. States Insulation Co.
AMARILLO, Ball Distributing & Engr. Co.
ATLANTA, Ga., Reynolds Aluminum Supply Co.
BALTIMORE, Md., Leroy Insulation Co.
BILLINGS, Mont., Big Horn Supply, Inc.
BIRMINGHAM, Ala., Shook & Fletcher Supply
Reynolds Aluminum Supply Co.
BROOKLINE, Mass., Homans-Kohler, Inc.
BUFFALO, Industrial Insulation Sales, Inc.
CHARLESTON, W. Va., Baldwin Asbestos Products Co.
CHARLESTON HEIGHTS, S. C., Stafford Insulation Co.
CHARLOTTE, N. C., Guy M. Beaty & Co
CHATTANOOGA, Guy M. Beaty & Co.
CHICAGO, E. C. Carlson Co.
CINCINNATI, R. E. Kramig & Co.
CLEVELAND, The Miles Materials Co.
COLUMBUS, Santeler Brothers
CORPUS CHRISTI, Texas, Precision Insulation Co.
DALLAS, Insulation Supply Co.
Payne-Ladewig, Inc.
DAVENPORT, Republic Electric Co.
DENVER, Gene Wright Lumber Co.
DES MOINES, Iowa, Iowa Asbestos Co.
DETROIT, Coon DeVisser Co.
EL PASO, Insulation & Specialties Co.
FARGO, N. D., Smith, Inc.
FT. SMITH, Ark., Gunn Distributing Co.
FT. WAYNE, Ind., M. H. Hilt, Inc
FT. WORTH, The Bracken Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
GULFPORT, Miss., Paine Supply Co.
HOUSTON, Precision Insulation Co.
INDIANAPOLIS, Central Supply Co.
IRON MOUNTAIN, Mich., Champion. Inc.
JACKSON, Miss., Paine Refrigeration & Supply Co.
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Kelley Asbestos Co.
LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Western Fibrous Glass Products
Thorpe Insulation Co.
LOUISVILLE, General Insulation & Roofing Co.
MEMPHIS, John A. Denie's Sons Co.
MIAMI, Crabtree Insulation Co.
Reynolds Aluminum Supply Co.
MILWAUKEE, F. R. Dengel Co.
MINNEAPOLIS, Asbestos Products, Inc.
MOBILE, Ala., Shook & Fletcher, Inc.
NASHVILLE, Reynolds Aluminum Supply Co.
NEWARK, N. J., Eastern Steam Specialty Co.
NEW HAVEN, Conn., Insulation Supply Co.
NEW ORLEANS, Eagle Asbestos & Packing
NEW YORK, Eastern Steam Specialty Co.
OKLAHOMA CITY, Ball Distributing & Engineering Co.
OMAHA, Cardinal Supply & Mfg. Co.
PHILADELPHIA, John F. Scanlan, Inc.
PITTSBURGH, Dravo Corp.
PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
RALEIGH, N. C., Reynolds Aluminum Supply Co.
RAPID CITY, S. D., Robbins & Stearns Wholesale
RICHMOND, Va., Reynolds Aluminum Supply Co.
ROCKFORD, Ill., Mott Brothers Co.
SALT LAKE CITY, Bullough Asbestos Supply Co.
SAN ANTONIO, The Bracken Co.
SAN DIEGO, Western Fibrous Glass Products
SAN FRANCISCO, Western Fibrous Glass Products
SAVANNAH, Ga., Reynolds Aluminum Supply Co.
SEATTLE, Western Fibrous Glass Products
SOMERVILLE, Mass., Thermal Insulation Co.
ST. LOUIS, The Brauer Supply Co.
ST. PAUL, Asbestos Products, Inc.
SYRACUSE, N. Y., Industrial Supply Co.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TALLAHASSEE, Fla., Bakers, Inc. of Tallahassee
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
WASHINGTON, D. C., Walter E. Campbell Co., Inc.
WICHITA, General Metals, Inc.
VANCOUVER, B. C., Fleck Brothers Limited

gb

What happens at Mach 11?

The answer to this question, along with other information on silicon carbide and other materials to meet severe or unusual conditions in processing or operation, such as extreme heat, abrasive action, corrosion, or other problems beyond the capabilities of conventional materials, is presented in manufacturer's eight-page bulletin. "Advanced Materials Technology" — Research & Development Div., The Carborundum Company, Niagara Falls, New York.

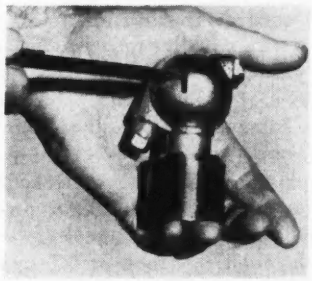
Check 4220 opposite last page.

Solves cleaning problem of compartmented tanker

Portable unit weighs only 7 lb — less than 2½" in diam

Uses: For cleaning tank truck compartments up to 12 feet long.

Features: Portable unit, weighing only 7 pounds and measuring less than 2½ inches in diameter, solves typical cleaning problem on compartmented tank trucks with small openings not large enough for man to enter or to permit use of standard cleaning equipment.

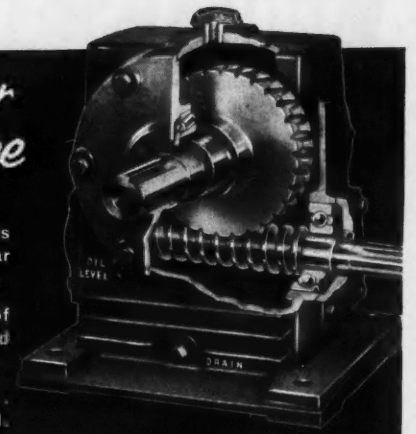


Portable unit solves difficult cleaning problem on compartmented tank trucks

Description: Portable tank truck cleaner is engineered of stainless steel and consists of hydraulically propelled rotary head which turns on self-cleaning, hardened stainless steel ball race. Spherical head

NEW 2" TO 3⅜" CENTER HYGRADE WORM GEAR SPEED REDUCERS

⅓ TO 5 HORSEPOWER INPUT



Plus Features for Plus Service

- Strong, tough cast iron housings insure exact and permanent gear alignment, rigid bearing support.
- Wide-faced worm gear, made of virgin alloy bronze, on a forged steel gear shaft.
- Alloy steel worm and shaft . . . carburized, hardened and ground.
- Extra capacity ball radial and thrust bearings on worm shaft; tapered roller bearings on worm gear shaft.
- Improved neoprene spring backed lip seals on shafts.

Now—Foote Bros. offers the longer service life, greater capacity-for-size, more compact design and extra quality of famous Hygrade Reducers in 96 new combinations.

Advanced worm gear design and Foote Bros. precision production techniques make these new Hygrade Reducers the most efficient and economical power packages you can buy. And they're easier to select and buy, because Foote Bros. Distributors and Branch Warehouses carry them in stock ready for immediate delivery.

IN STOCK at Your Nearby Foote Bros. Distributor or Factory Warehouse

Write for new Hygrade Bulletin

FOOTE BROS. Cut-Rated LIFETIME GEARING

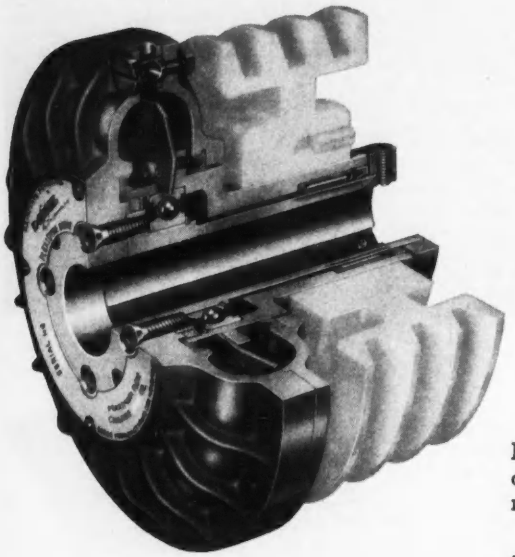
FOOTE BROS. GEAR AND MACHINE CORPORATION
4555 South Western Blvd.
Chicago 9, Ill.

FOOTE BROS.
Better Power Transmission Through Better Gears

Check 4221 opposite last page

WHAT'S YOUR PROBLEM?...

- ☑ Overheated motors?
- ☑ Excessive belt maintenance?
- ☑ Breakage of materials being processed —like thread, wire, paper?
- ☑ Expense of oversize or high torque motors?
- ☑ High demand rate?
- ☑ Expense of reduced voltage starters?
- ☑ Clutch trouble?
- ☑ Breakage of transmission parts due to instantaneous shock loads?
- ☑ Damage and recurring down-time from overloads?



FLEXIDYNE

THE DRY FLUID DRIVE

It is no longer necessary to accept the destructiveness—the costliness—of conventional starting in the mechanical transmission of power. Flexidyne changes that!

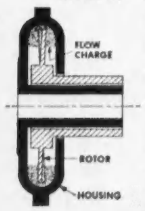
Flexidyne is the new way to start loads *smoothly*—to protect against shock and overload—to save power—all *without any sacrifice of efficiency at full load!*

This revolutionary development is ushering in "the day of the soft start"—which can mean thousands of dollars to you in equipment savings and in better, more economical operation.

Flexidyne is available, off the shelf, in Drives and Couplings. Capacities range from fractional to 1,000 hp. Ask your local Dodge Distributor or write us for technical bulletin.

DODGE MANUFACTURING CORPORATION, 6200 Union St., Mishawaka, Ind.

HOW FLEXIDYNE WORKS



The "dry fluid" in Flexidyne is tiny heat-treated steel shot. A measured amount, called the "flow charge," is contained in the housing, which is keyed to the motor shaft. Inside the housing is a rotor, free to revolve relative to the housing, but connected to the load.

When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, packing it between the housing and the rotor, which transmits power to the load. Initial slippage is momentary. Housing and rotor become locked together and achieve full load speed without slip and at 100% efficiency.

CALL THE TRANSMISSIONEER — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

DODGE

of Mishawaka, Ind.

Check 4222 opposite last page

ENGINEERING

is fitted with one wide-angle nozzle, and is slotted to provide three-directional spray. Adjustable offset jet permits spinning of spray head. Unit is fitted with a length of ¾" brass pipe, which is threaded to accommodate solution hose. Unit requires a minimum of auxiliary equipment.

(Spray-O-Mat is available from Oakite Products, Inc., 118F Rector Street, New York 6, New York.)

Check 4223 opposite last page.

Sand, slurry pump

Complete specifications for manufacturer's sand and slurry pump, as well as construction details and complete parts list, are contained in four-page bulletin. Capacity chart and dimension diagram for layout and design convenience are included. Bul 601 — Krogh Pump & Equipment Co., Inc., 515 Harrison St., San Francisco 5, Calif.

Check 4224 opposite last page.

Electronic motor controller adjusts speed, direction from small station

Uses: For operating ¾-hp shunt-wound motor on 220-230 volts, 50-60 cycles single phase. Motor speed is from 0-2400 rpm, with full torque from 300 to 2400 rpm.

Features: Motor can be started and stopped, reversed, and speed changed completely from small control station.

Description: Electronic motor controller embodies acceleration, reverse, coarse and fine speed adjustment. Controller is mounted in a steel cabinet 14" wide by 16" high by 6" deep. Control station components are mounted in steel box, 2 by 2 by 9", which is connected to controller with special ten conductor vinyl-jacketed cable 10' long.

(Model C60 electronic motor controller is product of Gerald K. Heller Company, 1819 Industrial Road, Las Vegas, Nevada.)

Check 4225 opposite last page.

Assemble, disassemble PVC 'quick coupling' in seconds

Will take up to 10 degree misalignment in pipe joints

Uses: For coupling temporary chemical, oil water, or disposal lines.

Features: "Quick coupling" can be assembled and disassembled in seconds. It will take up to 10 degree misalignment in pipe joints.

Description: Coupling has been developed from high-impact Koroseal polyvinyl chloride pipe. It withstands

"Quick coupling" of rigid PVC pipe can be assembled or disassembled in seconds

high-pressures, resists corrosion, and is lightweight. To install, push grooved end of pipe into coupling until the thrust-ring seats in groove. To disassemble, set disassembly tool in place and simply pull pipe out of coupling.

"Quick coupling" rigid pipe is available in 2, 3, and 4" sizes, and in standard 20 and 30' lengths. Variety of fitting adaptors, disassembly tools, and replacement gaskets are available.

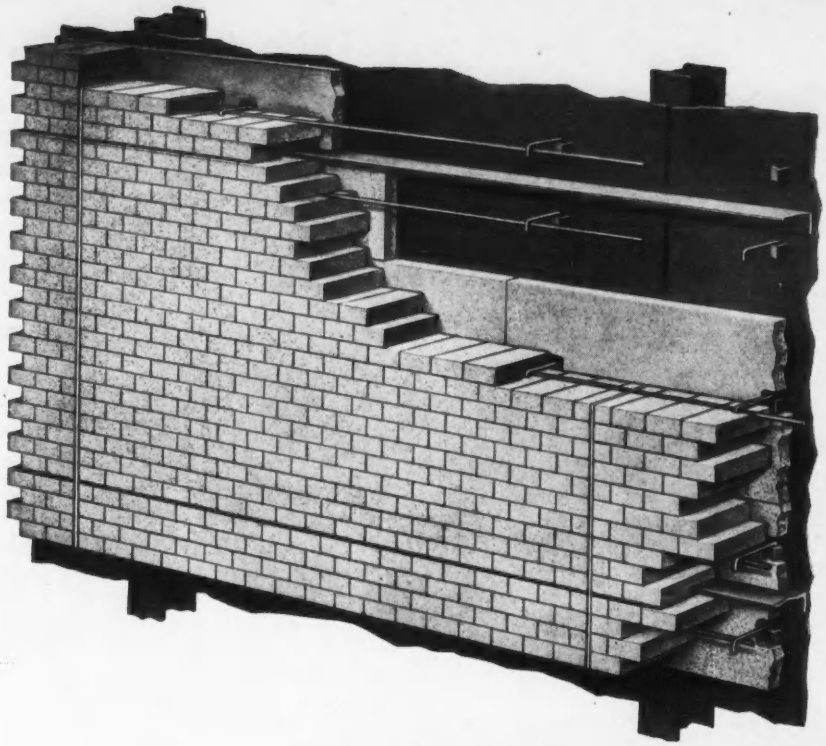
(Koroseal "quick coupling" is product of B. F. Goodrich Industrial Products Company, Marietta, Ohio.)

Check 4226 opposite last page.

Transmission belt info

Including detailed technical data, six-page bulletin describes transmission belts for speeds to 100,000 rpm and over. Graphs show results of competitive tests as to belt life and elongation. Transmission belt bul — The Russell Manufacturing Company, 477 East Main St., Middletown, Connecticut.

Check 4227 opposite last page.



B&W Insulating Firebrick sectionally supported wall construction, horizontal rod-type anchoring

Can this construction cut your costs?

Simplified design and lower material costs in initial construction, ease of installation and maintenance, reduced downtime and economy of operation—these are the benefits of this *lightweight* insulating firebrick construction.

Here's what lightweight means. Compared with dense fireclay refractory materials that weigh from 125 to 140 lb per cu ft, lightweight insulating firebrick weigh approximately 26 lb per cu ft for B&W's 2000 degree brick. This difference provides two major advantages: (1) mechanical, which largely affects design and construction, and (2) thermal, which saves in maintenance, downtime and operation.

Savings in design and construction

The use of lightweight IFB simplifies engineering requirements and reduces costs. A minimum of detailing is needed, since the design is engineered around one standard shape — a feature of B&W IFB constructions.

Material requirements are simplified, too. B&W IFB can be tailor-cut, drilled or shaped as necessary, eliminating the need for costly special fired shapes, and the delays in obtaining them. Typical sections, such as burner openings, observation ports and tube supports, can be cut and shaped on the job in minutes, using ordinary woodworking tools.

Substantial savings are possible in structural steel, since insulating firebrick roof and wall constructions are lighter. In locations with soil of poor load bearing capacities, this lightweight may also result in reduced foundation costs.

These savings, coupled with B&W's engineering and service facilities available during the design phase, mean lower initial costs.

Savings in maintenance, downtime and operation

Lightweight IFB offer a major thermal benefit—they store and conduct less heat. Heavy refractories retain heat; in the event of forced shutdown, they can cause burn-out of expensive alloy tubes, where used. The low quantity of heat stored by B&W IFB can be quickly dissipated, thus protecting these expensive tubes.

Further, this low heat storage permits faster heating and cooling. This means quicker access to the furnace in the event of emergency shutdown. Your maintenance crew can get in the furnace sooner and get it back on stream faster.

Supplied from nearby warehouses

With the use of simplified IFB constructions, refractory repairs can be quickly and easily accomplished with standard shapes from a nearby warehouse. This eliminates costly delays in obtaining special shapes.

Anchoring devices, too, are simplified. Since there are no expensive special castings in B&W IFB constructions, carbon steel or low alloy rods can be used. These are generally available from any local steel warehouse.

Increased efficiency

Generally, the lighter a firebrick the better an insulator it is. Since B&W IFB are the lightest insulating firebrick made, they are the most efficient insulators. Per inch of thickness, B&W IFB provide more insulation than any other refractory material. The result is that for walls of equivalent thickness less heat is lost with B&W IFB. Casing temperatures are lower, thus improving working conditions. This means increased efficiency and reduced operating costs.

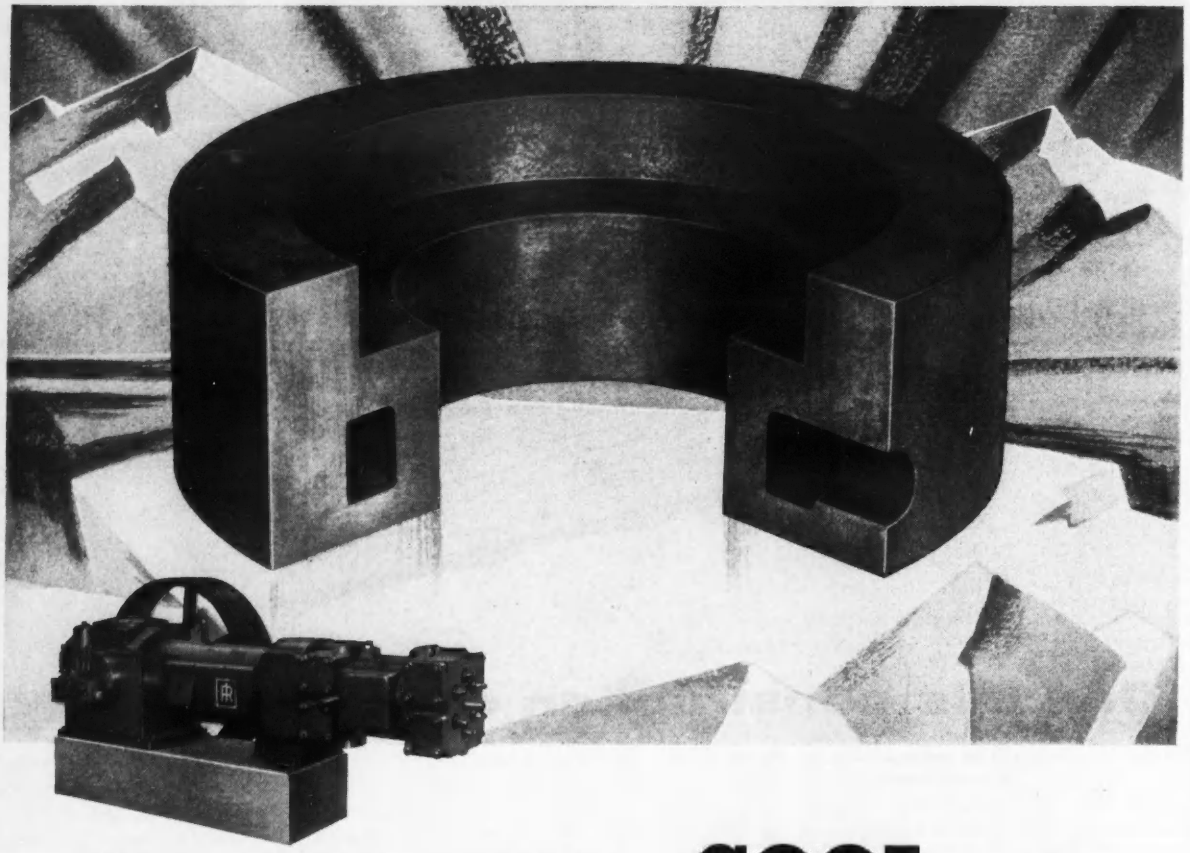
R 838

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

Check 4228 opposite last page

Look to **COOK** for Better Packings!

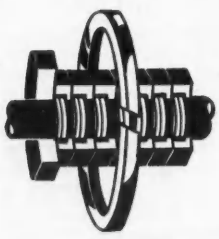


Keep your packing COOL with this leak-proof Cook packing cup!

CHANCES are you've never seen anything like Cook's water-cooled packing cup, as shown above with one of Ingersoll-Rand's new ESH compressors. That's because it's new, *with a leak-proof construction that's exclusive with Cook!*

Water circulates around the *inside of the cup itself,* in a completely self-contained channel. This eliminates any possibility of leakage, corrosion, or contamination of the material under compression. These are big advantages for all applications —and are naturally of even *greater* importance for non-lubricated service.

Write direct today for full details about this revolutionary new water-cooled packing cup. Address: C. Lee Cook Company, 932 South Eighth Street, Louisville, Kentucky.



C. LEE COOK COMPANY

Division of Dover Corporation

Rings and Packings Since 1888

Check 4229 opposite last page

95% of all radiant heat reflected by aluminum used as insulation

Foil is incapable of passing, absorbing, or holding vapor

Uses: As insulating material for ceilings, sidewalls, crawl spaces, and exposed ceiling installations.

Features: Material reflects 95% of all radiant heat. It is incapable of passing, absorbing, or holding vapor. Combined with polyethylene backing, a highly effective vapor barrier in itself, material insures complete moisture protection.

Description: Aluminum foil insulation, Type 22, consists of polyethylene base, a layer of aluminum foil, and a layer of foil-mounted kraft paper. These layers space themselves automatically on application. The "captive" air spaces between the aluminum sheets block convection, increasing foil's insulating effectiveness.

Type 44 foil consists of layer of polyethylene, two sheets of foil, and foil-mounted kraft paper layer. Three air spaces are created on application, providing greater thermal insulation value.

Aluminum foil insulation comes in compact, easy-to-store rolls, available for use on 12, 16, 20, or 24″ framing centers.

(Alfol Types 22 and 44 are available from Reflectal Corporation, 310 S. Michigan Ave., Chicago 4, Illinois.)

Check 4230 opposite last page.

THAT'S INTERESTING

Ship shape

Red oak replaces white oak in the USS Bittern, the Navy's first nonmagnetic minehunter, but only thanks to modern chemistry. White oak is normally the choice of the shipbuilders, but is in very short supply. Red-oak timbers do not withstand rigors of sea duty as well. So it has to be fortified.

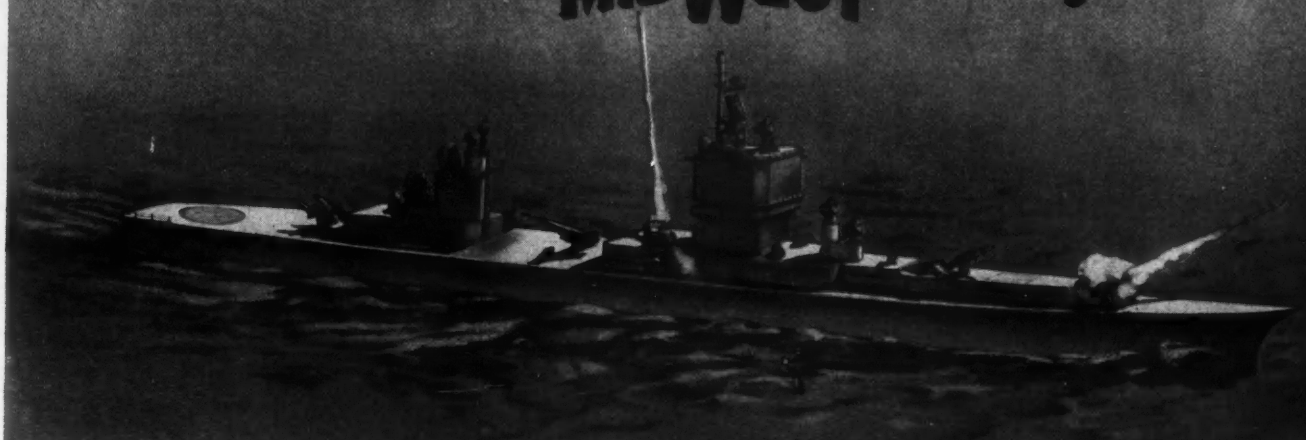
Timbers are protected against ravages of rot by impregnating them with a wood preservative, and a copper-bearing chemical that protects the lower hull against any marine borers. A water-tight bond, stronger than the wood it joins, results from the use of chemically developed adhesives to join timbers in laminate form.

Flying saucer

Way back in 1902 Mr. Harvey B. Van Voorhis was given a US patent on a version of . . . a flying saucer. Unfortunately, no working model was ever presented.

For more information on product at right, specify 4231 see information request blank opposite last page.

World's First Nuclear-Powered Surface Ship will have MIDWEST Welding Elbows



U. S. Navy's guided missile, nuclear-powered cruiser "Long Beach"

OFFICIAL U.S. NAVY PHOTOGRAPH

Special Fittings are "ROUTINE" for Midwest

Stainless Steel S.R. 102° Elbow with tangent on one end.

Stainless Clad S.R. 39° Elbow with tangent on one end.

Stainless Steel S.R. 90° Elbow with tangent on both ends.

Special Elbows (dimensions, tangents, wall thicknesses and materials) are easily provided by the exclusive and flexible Midwest method. Elbows are available in any material that can be secured as plate, which also means better delivery. Closer tolerances are inherent in the Midwest process. Quality control always exceeds Code requirements.

Shown here are three of the special stainless steel and stainless-clad elbows made by Midwest for the "U.S.S. Long Beach". All reactor coolant piping must meet extremely rigid specifications because of the difficult service. Special quality controls, such as ultrasonic testing, intergranular corrosion tests, dye checking, radiography, and ring flattening tests were used one or more times at various stages of manufacture from the raw material to the finished fittings. Special quality standards for soundness of metal, "water clear" welds, dimensional accuracy, and surface finish were satisfied.

The U. S. Navy's first nuclear-powered surface ship, the "Long Beach", will introduce a radically new concept in defense capabilities. She will operate offensively and independently of other forces under conditions of both nuclear and non-nuclear warfare against airborne, surface or under-sea opposition. In addition to equipment and weapons for detecting and destroying enemy submarines, she will carry the Navy's modern guided missiles.

The piping for the atomic reactors being designed and developed by the Westinghouse Electric Corporation will use a large number of special heavy wall stainless steel Midwest Welding Elbows. This is not the first atomic project for which Midwest Welding Fittings have been used. In fact, when the nuclear propulsion program first began, Midwest furnished special welding fittings for the "Nautilus" prototype installation at Arco, Idaho.

Whether or not you are concerned with nuclear power, Midwest Welding Fittings (both stock and specials) will do a better job for you. Ask your Midwest distributor or write us for Catalog 54, which tells you why.

MIDWEST PIPING COMPANY, INC.

Main Office: St. Louis 3, Missouri (P.O. Box 433)

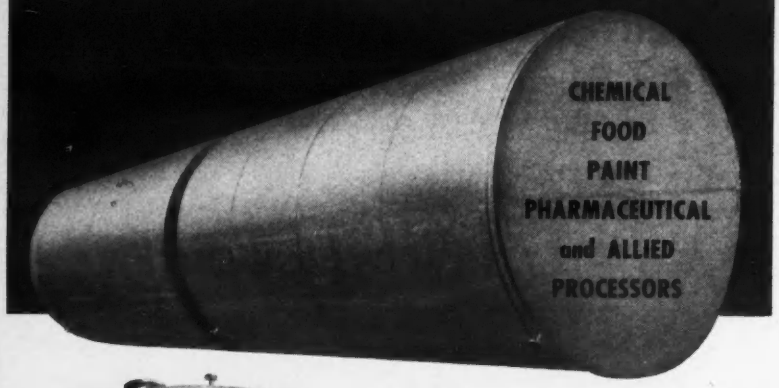
Plants: St. Louis, Clifton, N. J. and Los Angeles

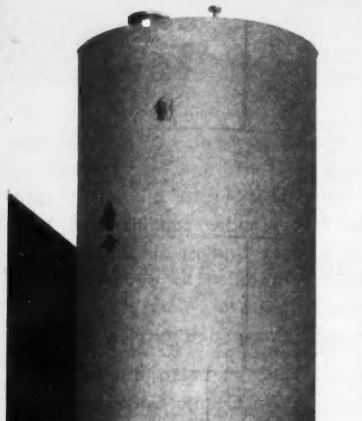
SALES OFFICES: ASHEVILLE (BOX 446, SKYLAND, N.C.) • BOSTON 27—426 FIRST ST. CHICAGO 3—79 WEST MONROE ST. • CLEVELAND 14—616 ST. CLAIR AVE. HOUSTON 2—1213 CAPITOL AVE. • LOS ANGELES 33—520 ANDERSON ST. MIAMI 34—2103 LE JEUNE RD. • NEW YORK 7—50 CHURCH ST. PITTSBURGH 19, PA.—437 GRANT ST. • ST. LOUIS 4—1450 S. SECOND ST. SAN FRANCISCO 11—420 MARKET ST.

STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

MIDWEST WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS

ALLOY
TANKS for INDUSTRY

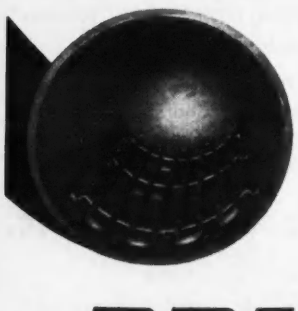




For more than four decades Brighton has fabricated equipment for the processing industry. From our modern and completely equipped plant, Brighton craftsmen build small tanks, large tanks, special tanks from all types of alloy metals.

Typical fabricating jobs include: fractionating columns, reactors, pressure vessels, (jacketed or unjacketed) coils, agitators, kettles, tanks, evaporators. Special machines weld, bend, flange, roll and form.

Brighton fabricates according to ASME code requirements. For creative engineering, craftsmanship and on time delivery of equipment, write for complete information. Prompt estimates on your fabrication requirements.



BRIGHTON
METALSMITHS EST. 1914
CORPORATION
820 STATE AVENUE · CINCINNATI 4, OHIO

Check 4232 opposite last page

Even seemingly insignificant items like rags used in general clean up operations can raise production costs. At Sinclair, experience has shown that . . .

paper wipers cut costs and improve safety

Problem: Little things, small dollar-consuming details like cleaning rags can spell out profit or loss. At Sinclair Refining Co., Marcus Hook, Pa., thousands of pounds of wiping materials are used annually to maintain machinery and equipment. A survey revealed that cost of laundering and handling cloth used for cleaning, and replacement expense, added up to a considerable total expenditure. This prompted a search for a less expensive, yet effective, means of taking care of wiping chores.

In mechanical department, where pumps, valves, and other equipment are repaired, rags were used to clean up oils, greases, and metal shavings. When valves were ground and lapped, rags were used to remove lapping compound from valve parts. In laboratory, instrument repair shop, paint room, control rooms, and numerous other sections, it was found that a considerable amount of time was consumed in finding fresh cloth and collecting used material so that a fire hazard would not occur.

Solution: After a trial use which showed that disposable paper wipers might be a practical solution, Sinclair began using them throughout refinery. Wipers are "Perf-embossed." They have hundreds of tiny pockets that absorb moisture and oils up to 50% more than smooth-surfaced wipers. Wet strength is added by chemical treatment so that even when sheets are solvent soaked they do not fall apart. Wipers are lint free.

Results: Disposable paper wipers have found ready acceptance throughout refinery and costs have been cut. Safety is improved because by

▲ Lint-free wipers speed cleaning of instrument panel. Housekeeping is quicker and easier and no fire hazard is created

◀ Cleaning oil-immersed switchgear prior to repairs. Handy paper wipers increase efficiency of maintenance

using a fresh sheet each time there is no danger of cuts, scratches, or chemical injury. Cleaning of parts is more thorough. This is particularly important in instrument work where residual foreign matter could cause failure.

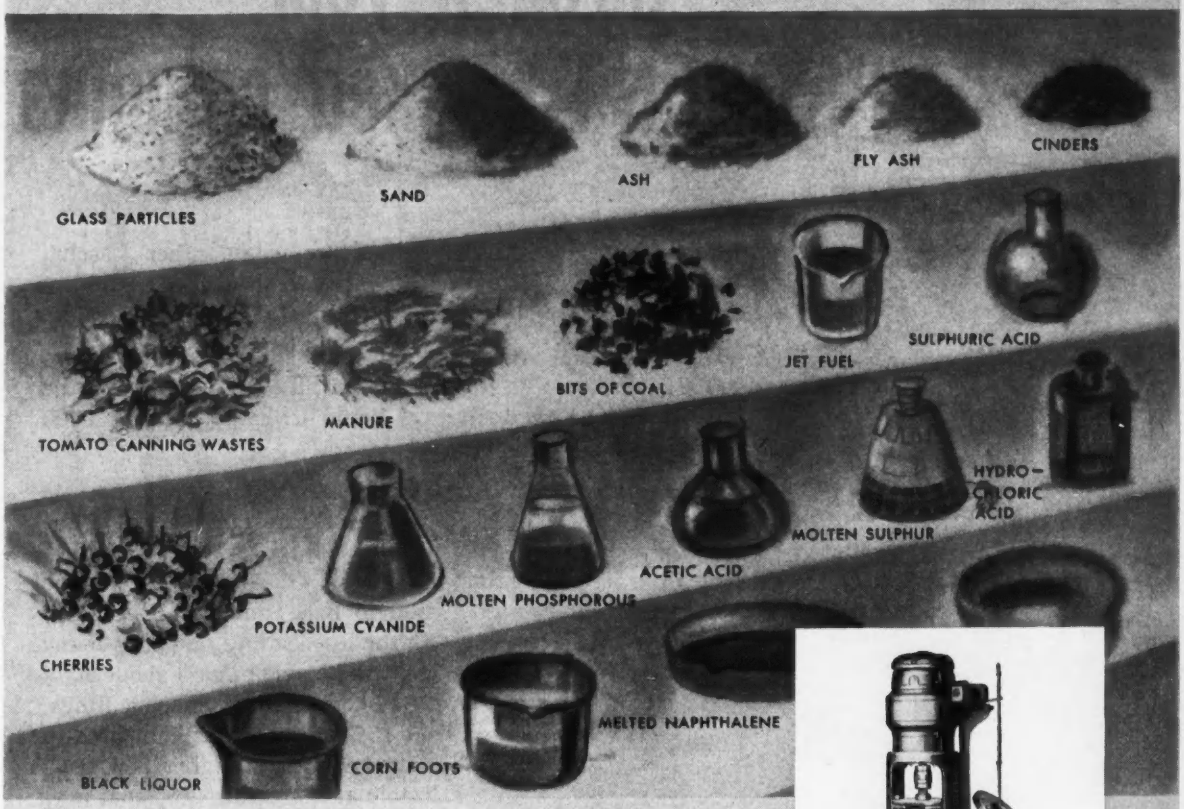
No Fire Hazard

Since paper wipers are deposited in metal containers immediately after use, removed daily, and emptied into incinerator, no fire hazard can exist. Housekeeping is easier. Handy boxes considerably reduce time required for workers to find a wiper when it is needed. Storage problems have been simplified since palletized cases of wipers use less storage space than bulk cloth wipers and can be easily delivered to area where they are needed.

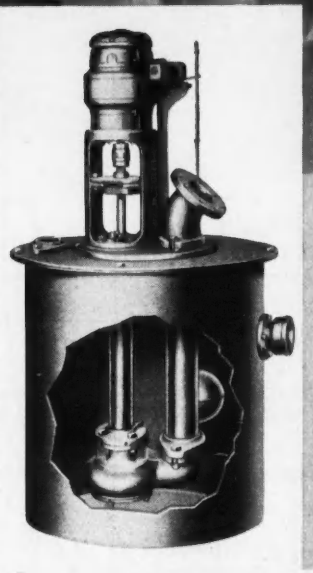
(Disposable paper wipers are a product of Scott Paper Co., Chester, Pa.)

Check 4233 opposite last page.

CUSTOM-BUILT TO PUMP ALMOST ANYTHING



Above, you see some of the usual, and not so usual, materials that are moved at low cost every day by Yeomans vertical wet pit pumps. Many are economically pumpable only because Yeomans adapts pumps to the job environment . . . not vice versa. We make all kinds of pumps, but for a lot of tasks requiring 15 to 5000 g.p.m., you can't beat a Yeomans vertical wet pit pump. It saves space. It's self-priming. It's easy to service. It's the cost-saving way to convey a wide variety of materials in processing and waste handling. Yeomans vertical wet pit pumps cost a little more, but their extra long life is worth it. Mail the coupon below. It will bring you complete information on these pumps, plus the engineering help and field service that back them up. Or for information in a hurry, see Sweet's Catalog—Plant Engineering and Industrial Construction Files.



YEOMANS

VERTICAL WET PIT PUMPS FOR INDUSTRY

Manufacturers of pumps for: drainage • processing • sewage • condensation return • water supply and circulation • also equipment for treatment of domestic and industrial wastes.

YEOMANS, 2003-5 N. Ruby Street, Melrose Park, Illinois.

Please send me the catalog on Yeomans Heavy-Duty Vertical Wet Pit Pumps for . . .

☐ solids-free liquids

☐ solids-bearing liquids

Name_____

Company_____

Street_____

City_____ Zone____ State_____

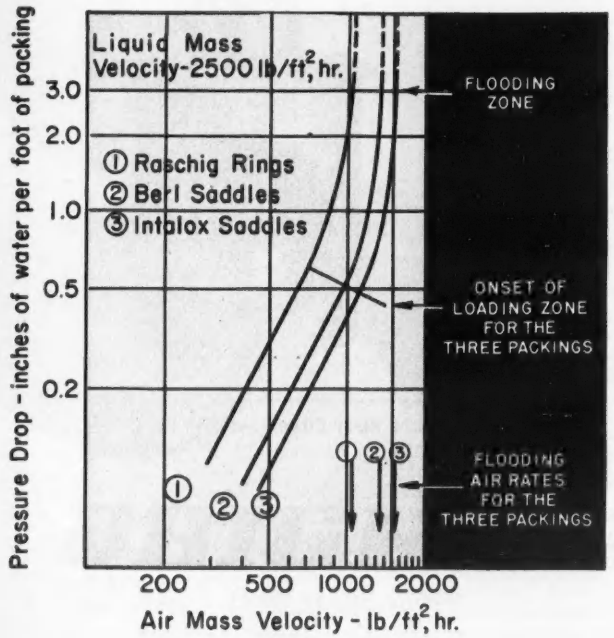
Check 4234 opposite last page

How to increase throughput through your PRESENT packed columns

If your present packed columns are using either Raschig Rings or Berl Saddles you can increase throughput substantially by re-packing your towers with Intalox Saddle packing.

The data in the accompanying chart show typical pressure drop, loading and flooding points for all three packings in the 1" size, all operated under a liquid irrigation rate of 2500 lbs./ft.^{2} hr.

You are ahead with Intalox Saddles in any way you operate your tower. Should you prefer to work substantially below the loading point, say at a gas rate of 500 lbs./ft.^{2} hr., your pressure drop savings as compared to Raschig Rings would be about 65%, and as compared to Berl Saddles, about 25%. Should you wish to operate in the low loading range, as many towers are being operated, you will be able to pass about 50% more gas through the tower, as compared to Raschig Rings; and about 15% more gas as compared to Berl Saddles. And these higher flow rates are realizable at a pressure drop that may actually be lower than you would have with Raschig Rings or Berl Saddles. Of course, the ultimate flooding limits of Intalox Saddles are also higher than for the other packings.



Like to know more about INTALOX SADDLES?

Write for a copy of Bulletin S-29 — full of data every engineer who is concerned with lower cost, more effective packed tower operation needs. Address Dept. CP358 The U. S. Stoneware Co., Akron 9, Ohio.

U. S. STONEWARE

AKRON 9, OHIO

132F

Check 4235 opposite last page

Engineering services

Engineering and design services to alleviate peak loads on existing engineering departments and supply specialized abilities anywhere in the US are fully described in six-page brochure. Engineering Services brochure — Allstates Design & Development Co., Inc., 25-27 North Warren St., Trenton, N. J.

Check 4236 opposite last page.

Pipe insulation simplified by snap-on material

Has service range of −200 to 250°F

Uses: For insulating pipe in low pressure steam, hot water service, and dual temperature applications.

Features: Snap-on material simplifies job of insulating. Less accessory materials are required. Material has service range of −200 to 250°F.

Description: Snap-on insulation is made of resilient urethane foam. Lightweight (3 to 3.25 lb/cu ft) material is clean and nonfriable. It has a thermal conductivity of .29 and, at 75°F, a tensile strength of 30 lb/sq in.

Snap-on type insulation of urethane foam simplifies pipe insulating

Insulation will not support combustion and can be stretched as much as 190%. Tough, resilient molded sections will mesh together tightly and will not shrink or crack. Material also has excellent resistance to ozone cracking.

Urethane foam insulation comes in standard lengths, but can be cut in random lengths

with a knife. It is available with factory applied moisture-vapor barrier jacket, or can be supplied plain. It is not affected by aliphatic hydrocarbons or 5% solutions of sodium hydroxide, hydrochloric, and sulfuric acids. It does not react with metals. Aromatic hydrocarbons and ketones cause it to soften slightly, but it regains its toughness after evaporation.

(Snap-on insulation is product of Delaware Insulation Company, Fifth Ave. and Colman St., Wilmington, Del.)

Check 4237 opposite last page.

(Insulation may also be obtained from Urethane Foam Division of Rainbow Industries, Inc., Butler, Pa.)

Check 4238 opposite last page.

(For more information on organic isocyanates for urethan foams contact E. I. du Pont de Nemours and Co., Wilmington, Del.)

Check 4239 opposite last page.

Valve can shut off flow after diaphragm failure

No lubrication or weir; long diaphragm life insured

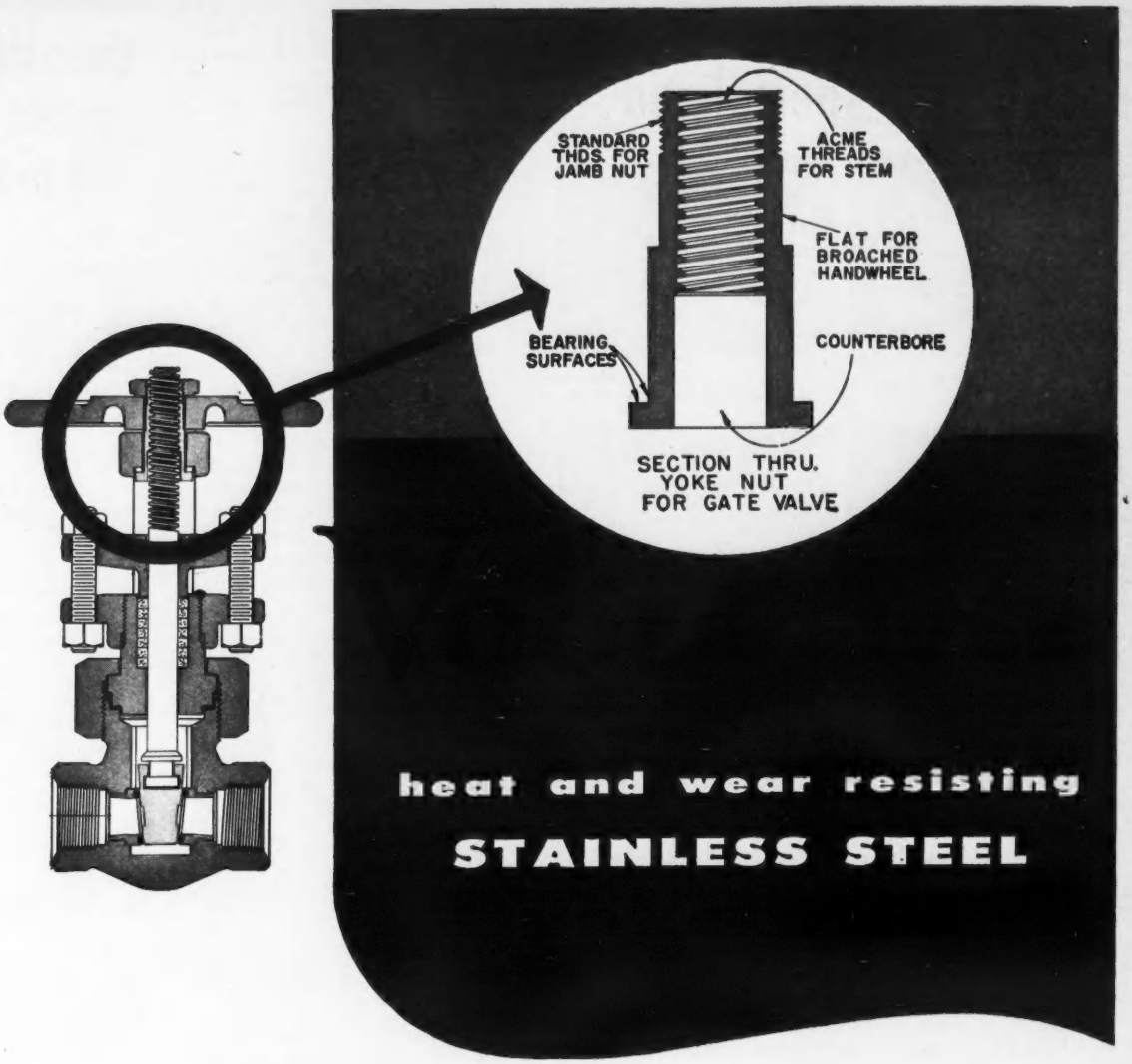
Uses: For chemical, oil, compressed air, gas, vacuum, and water service.

Features: Unit can completely shut off flow even after diaphragm failure. There is no stretching of diaphragm, insuring long diaphragm life under severest conditions. Unit needs no lube or weir.

Description: Diaphragm plug valve is available in the following types: screwed, butt, socket end or flanged — handwheel or quick-opening operation; air operated; 90°-angle flanged bodies. Valve body can be of cast iron, cast iron glass-lined, cast iron lined with rubber, steel, stainless steel, plastic, or bronze. Many types of rubber and plastic diaphragms are available.

(Dia-plug valve is available from Tru Flow Incorporated, 1622 Fillmore Ave., Buffalo 11, New York.)

Check 4240 opposite last page.



heat and wear resisting

STAINLESS STEEL

Heat and wear-resisting *stainless steel* yoke nuts in Vogt Valves give longer trouble-free service. We have proved this in our own "Torture Chamber," under constant and accelerated testing, as well as in tough service applications. They are made from a special stainless steel alloy having excellent bearing quality, matchless strength, and a melting point of approximately 2700°F.

The rotating gate valve yoke nut design, illustrated, has flats for a tight fit with the square broached hole of the handwheel. Non-rotating yoke nuts, for globe and angle valves, are of the same superior design and quality. Vogt GP Valves are available in a complete range of sizes from 1/4" to 2" and rated 800 pounds at 850°F. and 2000 pounds at 100°F.

Adv. No. 6 in a series describing the features of Vogt GP Valves.

Write For Your FREE COPY of Supplement No. 1 to Catalog F-9. Dept. 24A-FCP

HENRY VOGT MACHINE CO.
P. O. Box 1918 — Louisville 1, Ky.

SALES OFFICES: New York, Chicago, Cleveland, Dallas, Philadelphia, St. Louis, Charleston, W. Va., Cincinnati.

Vogt GENERAL GP PURPOSE Vogt FOR BETTER VALVES

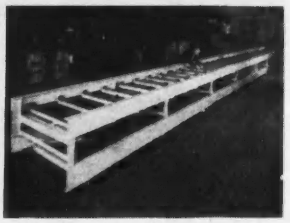
DROP FORGED STEEL

VALVES

Check 4241 opposite last page

ROUTINE
or highly specialized . . .

ASME code pressure vessel



Fifty-foot jig with cross pieces placed to micrometer tolerances

Complete cathode with copper bars welded to and around steel frame

Welded steel heat exchanger with built-in expansion joint

NIAGARA CAN BUILD THE EQUIPMENT THAT'S RIGHT FOR YOUR PROCESS

Production or research, usual or unusual—whatever your needs in process equipment, you can count on Niagara.

For nearly half a century, Niagara Welding & Boiler Works Inc. has specialized in building custom equipment for the chemical process industries throughout the U. S. A. Code pressure vessels, storage tanks, heat exchangers, scrubbing towers, autoclaves and electrolytic cell cathodes are but a few examples. Welding is a Niagara specialty, including highly specialized copper-to-copper and copper-to-steel.

Resourcefulness, skill in interpreting specifications, absolute integrity on confidential projects, sound financial structure, and a shop equipped with machines to handle an endless variety of assignments . . . these are the factors that assure you maximum return for your dollar.

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For a closer look at Niagara services, facilities, and products, send this coupon for illustrated literature today.

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Check 4242 opposite last page

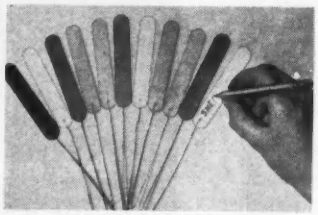
ENGINEERING

Plastic marking tag resists weather, stays readable

Ordinary pencil markings can be removed with cloth

Uses: As marking tags where corrosive forces may be present; whenever semi-permanent marking surface may be advantageous; where variety of colors might be helpful as a code; or where reusable tags are required.

Features: Ordinary pencil markings will remain in good readable condition even after tag has been exposed to outside weather for as long as two years. At the same time, pencil markings can be easily removed whenever desired by rubbing with cloth or balls of fingers.



Plastic marking tags measuring 3½ x ⅝" provide for semi-permanent marking with common pencil

Description: Plastic marking tags are available in five colors in quantities of 1000 or more. Tag is furnished with copper or plastic coated steel tie-wire attached, making it ready for immediate use.

(Plastic marking tags are product of J. H. Shepherd Son & Co., 1820 East Ave., Elyria, Ohio.)

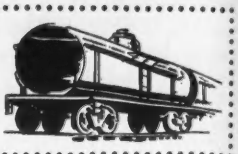
Check 4243 opposite last page.

Data on refractories

Refractories for every petroleum processing need are covered in four-page bulletin. Included are data on eight types of castable refractories, for service to 3000°F. Refractories bul — Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh 22, Pa.

Check 4244 opposite last page.

Unusual phenolic coatings protect tanks and drums



Series B-124 Unichrome Phenolic Coatings offer reliable and durable lining for tank cars, storage tanks, and processing equipment.

Some coatings in this series deposit films twice as thick as ordinary phenolic coatings. One has a built-in "cure control." By *color*, it indicates the completeness of curing.

For rough and tumble service in drums, a Unichrome phenolic lining gives reverse impact resistance superior to ordinary phenolics.

Many companies who can give you fast service specialize in applying Unichrome Tank and Drum Linings. For name of one nearest you, contact Metal & Thermit. Also, send for Bulletin Chem-C-2.

PLATING MATERIALS
ORGANIC COATINGS
TIN & TIN CHEMICALS
CERAMIC MATERIALS
WELDING SUPPLIES
METALS & ALLOYS
HEAVY MELTING SCRAP

METAL & THERMIT CORPORATION
GENERAL OFFICES: RAHWAY, NEW JERSEY
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Check 4245 opposite last page

DO YOU COOK IN BATCHES with LIVE STEAM?

WITH THE COMPLETELY NEW AND DIFFERENT . . .

NEMO JET COOKER

YOU CAN COOK *UNDER PRESSURE* — CONTINUOUSLY OR INTERMITTENTLY — AND *ONLY* AS NEEDED!

The cold mix is prepared in the usual way by the formulation each user has found best, and this COLD mix is piped to the NEMO JET COOKER placed near the point of use. ONLY the amount needed is cooked — INSTANTLY — continuously, or intermittently. This means that any formula cooked is FRESH.

The NEMO JET COOKER will handle any formula where live steam is used for cooking — including starches, dextrines, even including solids or abrasive materials.

The NEMO JET COOKER eliminates storage kettles entirely; and there is no need for expensive controls on cooking kettles or storage kettles.

Users in the Textile Industry tell us: "We are saving nearly 30% on sizing materials". . .

We invite your inquiries.

NEMO INDUSTRIES, INC.

3081 MAPLE DRIVE, N.E. • ATLANTA 5, GEORGIA

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for more information on any of the products or services mentioned in this issue of CHEMICAL PROCESSING?

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It's easy . . .

to use and can save time. Every month you will find a number at the end of each article or advertisement. Find this number on the slip and check it.

If several items from the same manufacturer are listed in the story just write the item down in the space provided on the Reader Service slip. Don't forget to include the key number.

Then fill out the slip and mail it to Reader Service Department. We will contact the manufacturer for you.

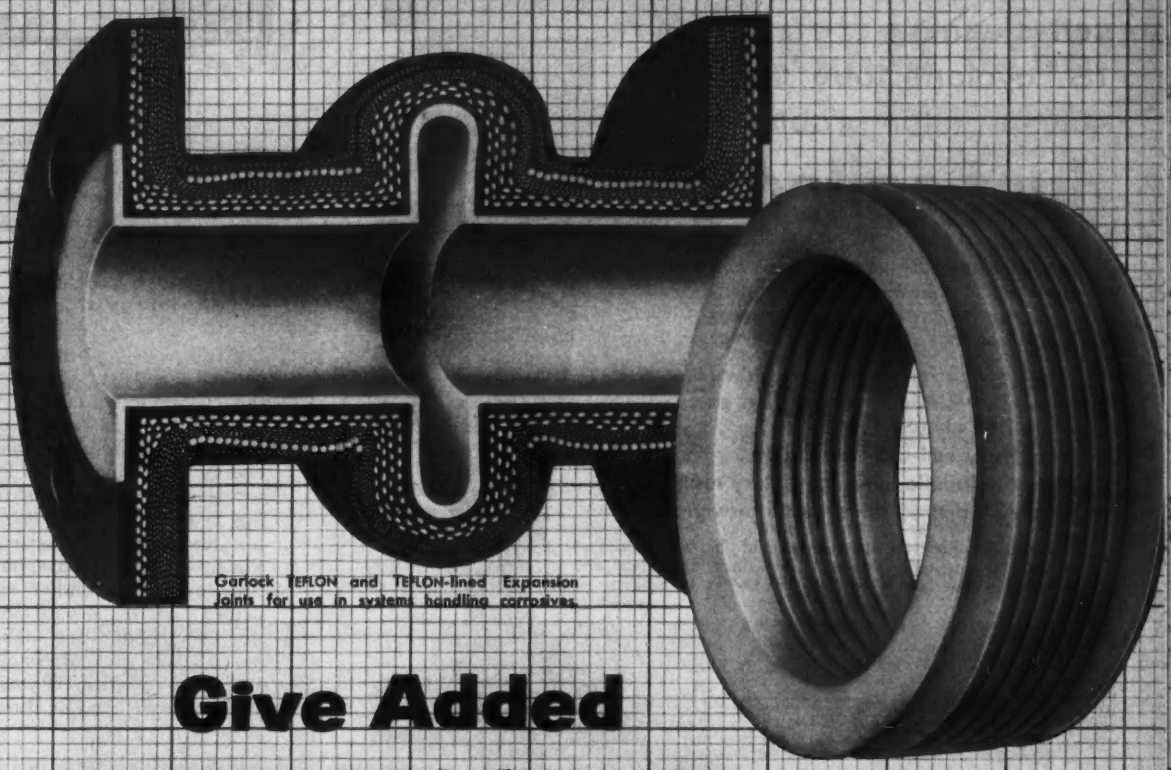
Additional details will be sent direct to you.

Be sure . . .

to fill in the slip with the other pertinent information: your name, title, company, product made, and address.

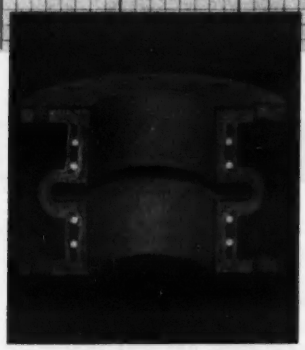
For more information on product at right, specify 4247 see information request blank opposite last page.

MORE OF THE GARLOCK 2,000



Garlock TEFLON and TEFLON-lined Expansion Joints for use in systems handling corrosives.

Give Added IMPACT RESISTANCE to costly piping



Cutaway of Garlock All-Rubber Expansion Joint shows steel reinforcing rings which vary in number with size. These Joints are available in sizes from 1¼" dia. to 18 feet in diameter.

Garlock Expansion Joints protect your costly piping from damage caused by shock, vibration, expansion or contraction. TEFLON Expansion Joints are recommended when corrosives such as acids, caustics, or solvents are being handled. TEFLON-lined Expansion Joints are used in higher pressure systems handling corrosives. All-rubber expansion joints are recommended for water, mild acids, mild caustics, air or exhaust steam at temperatures up to 180°F. The right size and type is available for handling any liquid or gas.

Expansion joints are another important part of "The Garlock 2,000" . . . two thousand different styles of packings, gaskets, and seals for every need. The only complete line. Ask your Garlock representative for his unbiased recommendations or write for Expansion Joint Folder AD-137.

THE GARLOCK PACKING COMPANY, PALMYRA, N. Y.
For Prompt Service, *Contact one of our 30 Sales Offices and Warehouses throughout the U. S. and Canada.*

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

self-cleaning
18" cyclone tube
solves major problems of

dust collection

Important savings in installation cost . . . negligible maintenance . . . uninterrupted performance . . . with all these the longer, larger cast tube originated by DUSTEX assures the following advantages:

- **Greater capacity with less air flow resistance**
- **Abrasion resistance of precision cast white iron alloy**
- **Completely self-cleaning action**
- **Ability to handle inherently sticky materials**
- **Higher efficiency with reduced pressure loss**

WIDELY PROVEN. Recovers dry chemical and pharmaceutical dusts, cement, limestone, slag and silica dusts, and many other valuable materials. Write today for D-584 descriptive bulletin.

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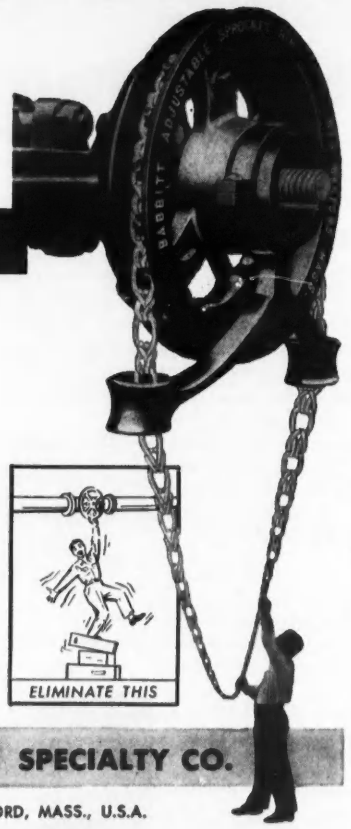
DUSTEX CORP.

Check 4248 opposite last page

Safe Operation
of Overhead Valves
with a

Babbitt

Adjustable
SPROCKET RIM
with Chain Guide



- Simplifies pipe layout
- Fits any size valve wheel
- Easy to install and operate
- Operates any valve from plant floor
- Time and money saving fixture
- No maintenance; first cost only cost
- Packed, completely assembled, one to a carton
- Hot galvanized, rust-proof chain available for all sizes
- Easy to follow instructions with each unit
- Your supplier carries complete stocks
- Write for new descriptive catalog sheet and prices

Babbitt STEAM SPECIALTY CO.

14 BABBITT SQUARE, NEW BEDFORD, MASS., U.S.A.

Check 4249 opposite last page

new literature

Industrial bulletins pertinent to the reader . . . offering data on products, processes, services. Additional reviews of catalogs, bulletins, data sheets, etc., are found throughout other sections of this magazine

Atomic energy story

Illustrated booklet of 28 pages describes race for world's first self-sustaining nuclear reaction, and traces briefly company's activities in the atomic energy field since 1942. Processing steps involved in turning crude uranium into usable fissionable fuel are outlined, and photographs or drawings of a number of reactors now in service or under construction are included. Form 9125 — Mallinckrodt Chemical Works, Second & Mallinckrodt Sts., St. Louis 7, Missouri.

Check 4250 opposite last page.

Versatile filling machines

Features and specifications of six of manufacturer's typical automatic filling machines for semiliquids and semisolids are presented in 4-page folder. Manually operated and semiautomatic fillers are briefly outlined, and auxiliary equipment is described in detail. Form FA-58, The Filler Machine Co., Inc., 10 Penn Ave., Rockledge, Philadelphia 11, Pennsylvania.

Check 4251 opposite last page.

Roller-conveyor bulletin

Detailed information on construction features, rollers, frames, straight- and curved-section accessories of roller gravity conveyor are contained in four-page bulletin. Bul RR-57 — The Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids 2, Michigan.

Check 4252 opposite last page.

Pilot-operated regulators

A bulletin of 6 pages describes two series of steam regulating valves with pilots for both fast and slow heating exchangers. Selection tables and line drawings of typical applications are shown. Bul 1012 — Spence Engineering Co., Inc., Walden, N.Y.

Check 4253 opposite last page.

Solvent, plasticizer data

Handy slide rule, 7½" long by 3" high, gives physical properties of 32 common plasticizers and 34 oft-used solvents. In addition, there are conversion tables for weights, volumes, temperature, and viscosities. Comparator — Eastman Chemical Products, Inc., 260 Madison Ave., New York 16, New York.

Check 4254 opposite last page.

Acid-resistant apparel

Latest advances in acid-resistant and lint-free industrial clothing are described and illustrated in catalog. Cat — Dept. PR-1, Worklon, Inc., 253 W. 28th St., New York 1, New York.

Check 4255 opposite last page.

Graphite heat exchangers

Latest data on standards and optional designs of impervious graphite tube and shell heat exchangers are covered in eight-page bulletin. Bul 448 — Falls Industries, Inc., Aurora Road, Solon, Ohio.

Check 4256 opposite last page.

Tube fittings

Ferrule and swivel-flange fittings are described in six-page bulletin. Principle of expanding tubing into ferrule allows leakproof joints to be quickly made. "Avica Tube Fittings" by — Avica Corp., PO Box 180, Newport, R. I.

Check 4257 opposite last page.

Lists nonionic detergents

File-folder compares physical properties of Renex nonionic detergents. Folder CD-117 — Atlas Powder Co., Chemicals Div., Wilmington 99, Del.

Check 4258 opposite last page.

Presses and dryers

Pressing, drying, and cooling equipment and services offered are described in manufacturer's Cat C — Davenport Machine and Foundry Company, Davenport, Iowa.

Check 4321 opposite last page.

WANT MORE INFORMATION . . .

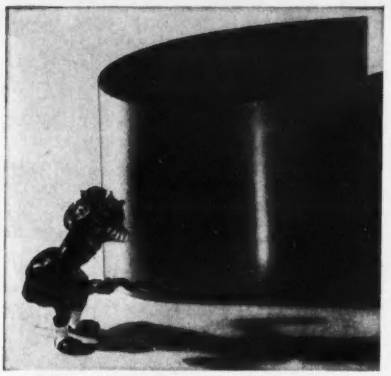
. . . about things you read about in the New Literature Section?

Here's How To Get It

Note the number in the last line of each new literature review. Check this key number on Reader Service slip opposite last page of this issue. Fill in the slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department. We will contact the manufacturer for you, telling him you'd like a copy of the bulletin. He'll send it direct to you.

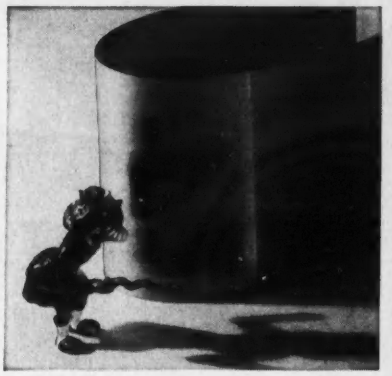
No matter which *FINISH* you like—you can buy it in

MicroRold® QUALITY STAINLESS STEEL



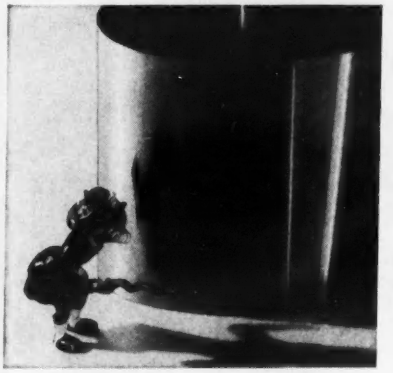
2D—A silvery white, but non-lustrous, surface produced by annealing and pickling cold reduced material. Steel sheets & strip in this condition are most ductile and the surface holds lubricant well for severe drawing operations.

2B—Steel in the 2D condition which is subsequently rolled on a "skin pass" or temper mill. The surface acquires a bright finish from the polished rolls. This surface is somewhat more dense and hard than 2D and is a better starting surface for later finishing and buffing operations.

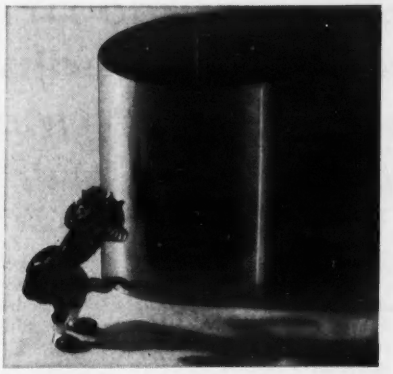


No. 3—This surface is made by grinding with a No. 100 abrasive. This surface is smooth but not as reflective as 2B.

No. 4—A finer finish than No. 3 made by grinding with a No. 150 abrasive. Like No. 3, this surface is easily blended with hand grinders after forming, drawing or welding.



No. 7—Good reflectivity and brilliance made by polishing with a No. 400 abrasive. This semi-mirror finish must be protected during fabrication by adhesive paper or strippable plastics lest the finish be marred beyond repair.



BRIGHT—A highly reflective surface made by cold reducing with highly polished, glass-hard rolls. This finish is only available in Type 430 stainless.

These are our standard surface finishes that are available in types 201, 202, 301, 302, 304 and 430 except Bright which is type 430 exclusively.

These finishes are regularly supplied in sheet and coil form in widths up to 48 inches.

Since Nos. 3, 4, 7 and 430 Bright are smooth reflective surfaces, they are not recommended for severe drawing without special precautions as the mill finish may be marred. Applications such as dairy machinery, kitchen and restaurant equipment and architectural decorative work require only local forming, so these highly polished surfaces are not greatly disturbed. All mill polished sheets are carefully packed to avoid handling imperfections. Protective adhesive paper can be specified by the buyer when needed.

For specific information on recommended surface characteristics for a particular stainless steel sheet and strip application, address your request to our Product Development Dept.

Washington Steel *Corporation*

Producers of Stainless Sheet and Strip Exclusively

3-U WOODLAND AVENUE, WASHINGTON, PA.

Check 4259 opposite last page

NEW VERTICAL LEAF FILTER

permits use of any filter medium— *minimum hold-up of liquid no danger of overloading*

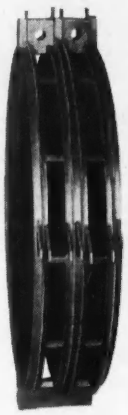
The Shriver Vertical Leaf Filter—a new concept in enclosed, pressure filtration equipment—overcomes the limitation on usable filter media and eliminates difficulties in cleaning, if the filter is overloaded.

1—When operated with frames, the Shriver Filter can be used with any paper or other filter medium available in sheet form. Cake of any desired thickness can be built up.

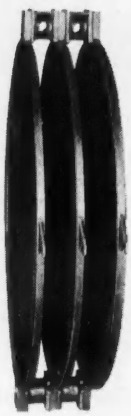
2—When used as a precoat filter, the fact that the leaves can be easily separated, makes it unnecessary to provide excessive leaf spacing to prevent damage from overloading. There is minimum hold-up of unfiltered material.

3—Leaf spacing may be easily changed; ready conversion from top to bottom feed (or vice versa); no pipe connections to break when cleaning.

4—Now available in steel or stainless steel construction for total filtering area to 500 sq. ft., for filtering pressures to 80 psi. Larger sizes to specifications.



Leaves with filter paper; frames can be of any desired thickness for cake recovery.



Leaf arrangement for precoat filtration; leaf spacing may be reduced to minimum.

Inquiries invited

T. SHRIVER & COMPANY, INC.
846 HAMILTON STREET • HARRISON, N. J.

SALES REPRESENTATIVES IN: Decatur, Ga.—Houston, Tex.—Livonia, Mich.—St. Louis, Mo. San Francisco, Cal.—Montreal, Que.—Toronto, Ont.

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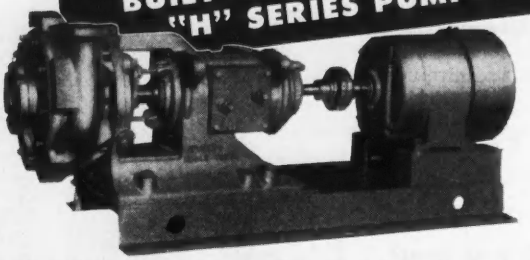
HORIZONTAL PLATE FILTERS • CONTINUOUS THICKENERS
SLAB FORMERS • DIAPHRAGM PUMPS • ELECTROLYTIC CELLS

Check 4260 opposite last page

"INTESTINAL FORTITUDE" BUILT INTO NEW NAGLE "H" SERIES PUMPS



The new "H" Series of Nagle Pumps, designed exclusively for the abusive pumping jobs of industry, is simplicity itself. Three types of water ends available to meet specific conditions, type "HF", "HC" and "HR" (shown). Various alloys used for water-end members depending upon corrosive, abrasive or high temperature conditions involved. Water-end can be rotated to any one of four discharge positions. Slippage seal adjustment takes only moments using a common wrench. Packing gland is readily accessible. Radial adjustment of shaft to insure concentricity through stuffing box is a matter of seconds. Various types of impellers available. Impellers readily accessible. Oil or grease lubrication is optional. Sizes from 1" to 10". Heads up to 250' or more. Capacities to 4,000 G.P.M. A "must" for those tough applications where ordinary pumps fail. Send for Bulletin "H"

NAGLE PUMPS

NAGLE PUMPS, INC.
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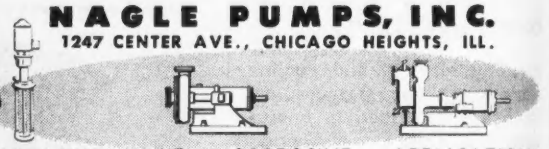
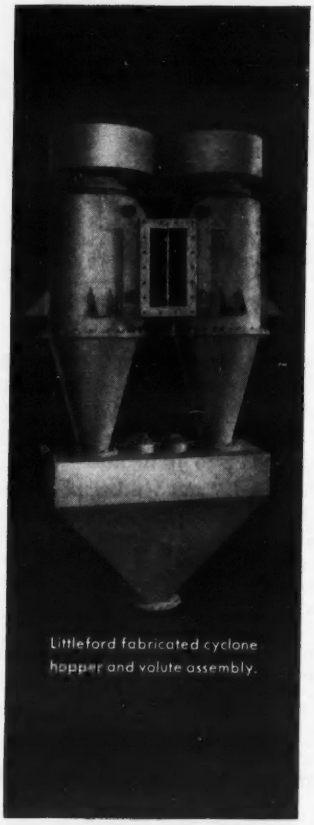


PUMPS FOR ABRASIVE AND CORROSIVE APPLICATIONS

Check 4261 opposite last page



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LITTLEFORD BROS., Inc.
417 E. Pearl Street, Cincinnati 2, Ohio

Check 4262 opposite last page

On centrifugal force

Manufacturer offers booklet showing how centrifugal force is applied to various processing applications. Types of equipment are described. "Centrifugal Force" — American Tool & Machine Company, 1423 Hyde Park Ave., Boston 36, Mass.

Check 4185 opposite last page.

Help hiring hints

Handy check list of 100 suggestions for hiring and holding help has been compiled into six-page folder. Questions enable you to analyze your company's effectiveness in advertising for help, sources of procurement, in-plant facilities, treatment of employees, indoctrination of employees, etc. "100 Suggestions for Hiring and Holding Help" —Manpower, Inc., 820 N. Plankinton Ave., Milwaukee, Wisconsin.

Check 4263 opposite last page.

Spotlights lab equipment

Catalog of 12 pages lists data on laboratory equipment including electrobalance, chromatograph, constant temperature circulator, furnace, balances, homogenizers, etc. "Laboratory Spotlight Number 14" — Harshaw Scientific, Div. of Harshaw Chemical Company, 1945 East 97th St., Cleveland 6, Ohio.

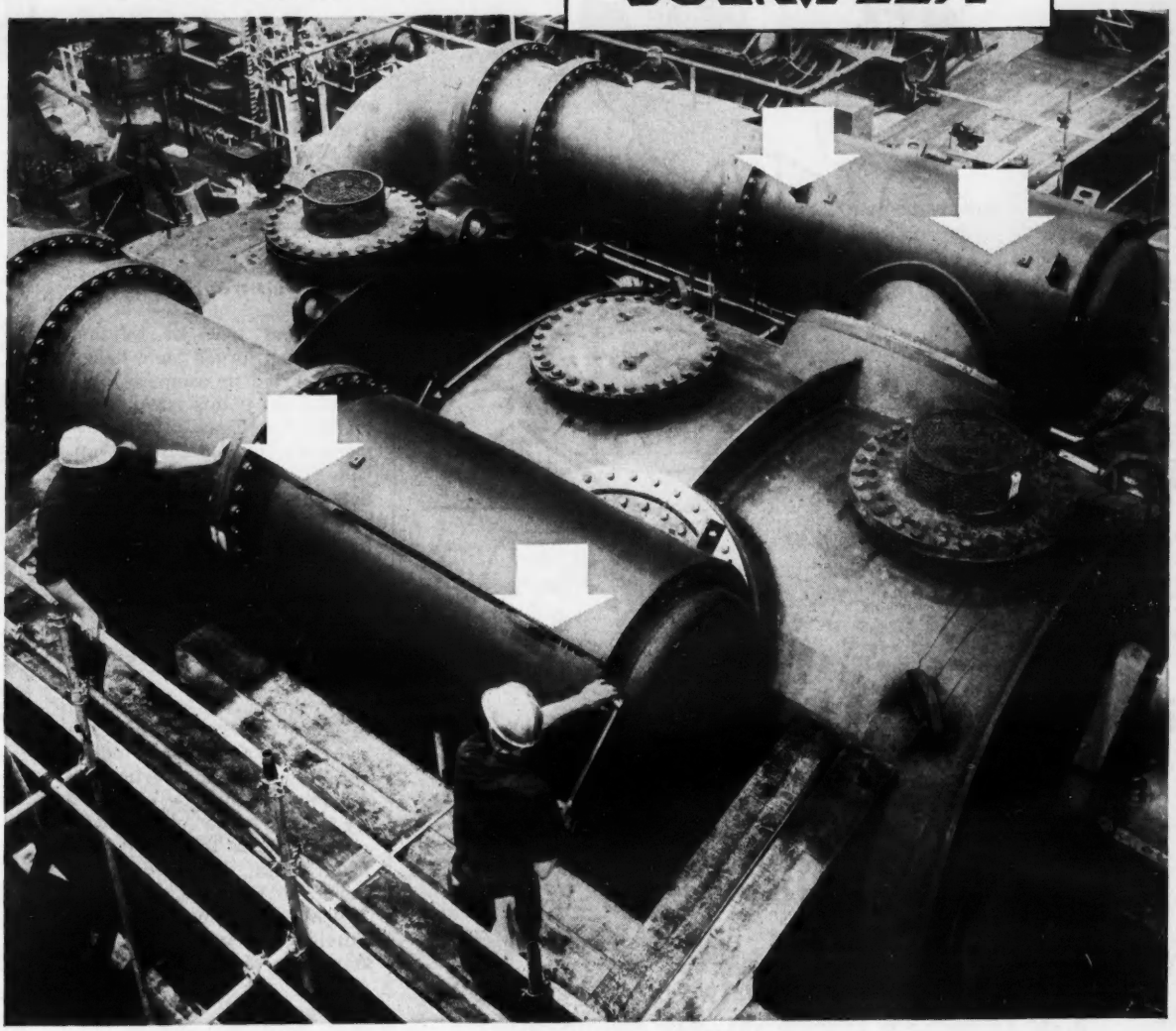
Check 4264 opposite last page.

Replacement parts story

Bulletin of eight pages explains why manufacturer's own replacement parts are recommended for best performance and service life. Drawings and cutaways show individual characteristics of parts with emphasis on their physical and metallurgical design features. Booklet is available in English, French, Spanish, and Portuguese. Form DE760 — Caterpillar Tractor Company, Peoria, Ill.

Check 4265 opposite last page.

Leading firms use SOLA-FLEX®



Sola-Flex joints installed on large steam turbine-generator

TWO 36-INCH SOLA-FLEX expansion joints constrain a pressure thrust of 78,000 pounds on this 225,000-kw General Electric steam turbine-generator. These rugged, pressure balanced elbow joints are an important example of why more and more of America's leading businesses—petro-chemical, power, nuclear and others—rely on Sola-Flex bellows and expansion joints to help solve difficult pressure and temperature problems. Solar manufactures the most comprehensive line of bellows and expansion joints in the world. They are made from a wide variety of stainless and high alloys that are *right* for important nuclear, missile and industrial applications—in sizes ranging from ½ in. to 35 feet in diameter. They are built for service from –320 F to 1200 F, and tame "hard-to-handle" pressures up to 3500 psi for special applications.

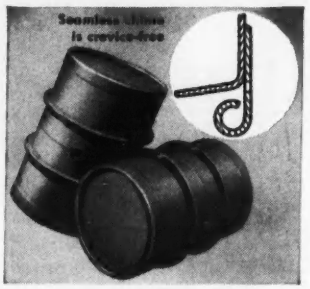
A new pamphlet describes Solar's complete line of Sola-Flex bellows and expansion joints. Write for it to Dept. D-152, Solar Aircraft Company, San Diego 12, California.

SOLAR AIRCRAFT COMPANY — SAN DIEGO, DES MOINES

DESIGNERS, DEVELOPERS AND MANUFACTURERS *of gas turbines, expansion joints and aircraft engine, airframe and missile components.*

Check 4266 opposite last page

as easy as washing seamless pans



Seamless chimes of Hackney two-piece acid drums harbor no acid traces between shipments

Here's one reason why so many leading sulphuric acid producers ship in Hackney Acid Drums. Hackney two-piece acid drums are made with entirely *seamless chimes.* They have no interior cracks or crevices where acid traces can linger and carry on intensive corrosion between shipments. Controlled heat treatment further increases corrosion resistance of selected, top-quality steel. Meet ICC specifications for the safe transportation of corrosive liquids such as sulphuric acid, aqua ammonia, titanium tetrachloride, caustic potash and many others.

Rugged and Durable—Take shipping and handling abuses on the chin thanks to such construction features as reinforced chimes, sturdy I-bar rolling hoops, heavy forged spuds. Standard capacities of 15, 20, 30, 55 or 110 gallons. Send today for Drum and Barrel Catalog and minimum quantity data.

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Branch offices in principal cities
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Hackney

Check 4267 opposite last page

NEW LITERATURE

Plasticizer advantages

Detailed data on properties, performance, and uses for monomeric epoxy plasticizers are in tech bulletin. Bul 3 — Argus Chemical Corporation, 633 Court St., Brooklyn 31, New York.

Check 4268 opposite last page.

Pipe fit-up trouble?

Types and sizes of welding fittings and forged-steel flanges are listed in company bulletin that points up fitting features such as precise dimensions for precise fit-up. Bul FB504 — Tubular Products Div., The Babcock & Wilcox Company, 3839 W. Burnham St., Milwaukee 46, Wis.

Check 4064 opposite last page.

Bonding of polyethylene

According to 39-page report of recent Army Ordnance research, normally poor adhesive bonding properties of polyethylene can be improved by treating the plastic with chromic acid. Treatment procedures are described in report. To obtain report PB 131099, "Bonding of Polyethylene", remit $1.00 direct to Office of Technical Services, U. S. Department of Commerce, Washington 25, District of Columbia.

Check 4269 opposite last page.

Steel plate fabricating

Fabricating and warehousing of steel plate are described and illustrated in eight-page bulletin. Steel plate fabricating bul — McGregor-Michigan Corporation, 5818 Rivard St., Detroit 11, Mich.

Check 4270 opposite last page.

Planning process plants

Scale models are discussed as a tool to communicate engineering concepts and to improve methods of designing process plants in manufac-

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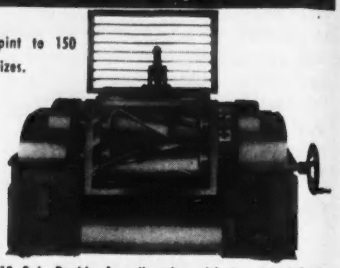
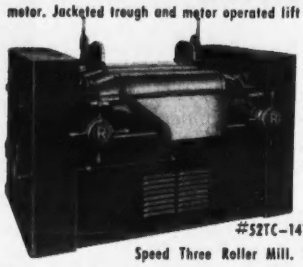
• 1 pint to 150 gal. sizes.



#41L—10 Gal. Double Arm Kneader with two speed brake motor. Jacketed trough and motor operated lift optional.

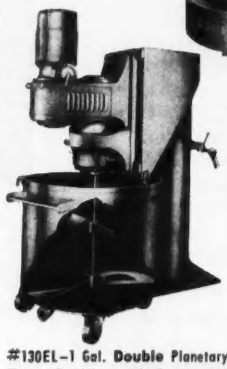


• 4½ x 10, 6 x 14, 9 x 24, 12 x 30, 14 x 32, 16 x 40" sizes.

#52TC—14" x 32" High Speed Three Roller Mill. Hydraulic adjustment and pressure recording gauges optional.

#30C—50 Gal. Heavy Duty Change Can Mixer. Adjustable outer scraper, cover with charging port, and gates on cans optional.

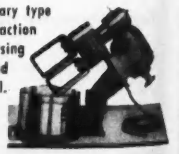
• 8, 16, 20, 50 and 60 gal. sizes.



#130H—250 Gal. Change Tank Mixer with hydraulic raising and lowering and variable speed motor. Various type stirrers and high speed impellers optional.

• 80, 150 and 250 gal. sizes.

#130EL—1 Gal. Double Planetary type Change Can Mixer with shearing action stirrers, and variable speed reversing type motor. Jacketed cans and portable trucks for cans optional.



• 1, 2, 3, 4, 6, 15, 25, 50, 65, 85, 110 and 150 gal. sizes.

Write for complete information on these or other types of Ross equipment.

CHARLES ROSS & SON COMPANY, INC.
154 Classon Avenue
Brooklyn 5, New York

Check 4271 opposite last page

turer's 12-page brochure. Usefulness of models is pointed out, and evidence of their communication value is presented. How company has used models to resolve questions of plot arrangement, equipment handling, process flow, plant operation, and plant maintenance is shown by citing specific case histories. "Models: New Route to Better Plant Design" — The M. W. Kellogg Co., Subsidiary of Pullman Inc., 711 Third Ave., New York 17, New York.

Check 4272 opposite last page.

PVC pipe data

Catalog of 30 pages contains properties, applications, and installation data for PVC pipe. Chart of eight pages classifies corrosion-resistance ratings of Types I and II PVC and other types of pipe material for 383 chemicals. PVC pipe cat — Engineering Service Dept., A. M. Byers Co., Clark Bldg., Pittsburgh, Pa.

Check 4273 opposite last page.

Fire equipment

A comprehensive listing of fire engines and fire protection equipment is covered in 84-page book. Fire extinguishers, hoses, signals, lighting, and other apparatus are included. For "Fire Department Supplies", make letterhead request to American LaFrance Corp., Dept. 570, Elmira, N. Y.

Air pollution control

Successful applications of catalytic oxidation to four difficult air pollution control problems are reviewed in six-page technical reprint. Paper details actual installations, and photos, charts, flow diagrams, and bibliographical references supplement material. "Versatility of Oxidation Catalysts for Industrial Air Pollution Control" — Oxy-Catalyst, Inc., Wayne, Pa.

Check 4274 opposite last page.

Did You Ever Hear of 400-S-2?

400-S-2 is a form which details all metering variables. It gives us the information needed to recommend suitable meters for any liquid used in or around your plant. Write or mail the handy coupon.

If it's a liquid . . . that can be poured or piped

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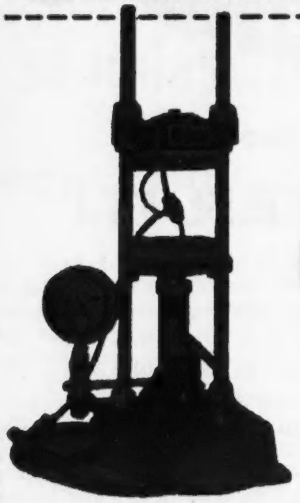
Standard for Research and Development



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Check 4277 opposite last page

NEW LITERATURE

Slim motor

Flange-mounted motor, up to 60% shorter and 33% lighter than conventional motors of same rating, is described and illustrated in manufacturer's bulletins. Motors are sized from 1 to 15 hp, at 1800, 1200, and 900 rpm, in open drip-proof and enclosed non-ventilated or fan-cooled enclosures. Buls 2100 and 2150 — Louis Allis Co., 448 East Stewart St., Milwaukee 1, Wis.

Check 3831 opposite last page.

How to handle H_2O_2

Two useful wall charts, each measuring 16 x 21" and printed in large type, tell how to handle hydrogen peroxide safely. Charts issued by Becco Chemical Div., Food Machinery & Chemical Corp., Buffalo 7, New York.

Check 4278 opposite last page.

Lists lab glassware

Catalog of 56 pages illustrates, describes, and prices manufacturer's standard scientific glassware and special scientific glass apparatus. Catalog price list — Delmar Scientific Laboratories, 4701 W. Grand Ave., Chicago 39, Ill.

Check 4279 opposite last page.

Details vertical filters

Manufacturer's vertical pressure filter equipment is described in 12-page catalog. Flow diagrams explain typical filtration cycle. Company's engineering services are also listed. Bul EF/2 — Enzinger Div., The Duriron Company, Inc., Angola, N. Y.

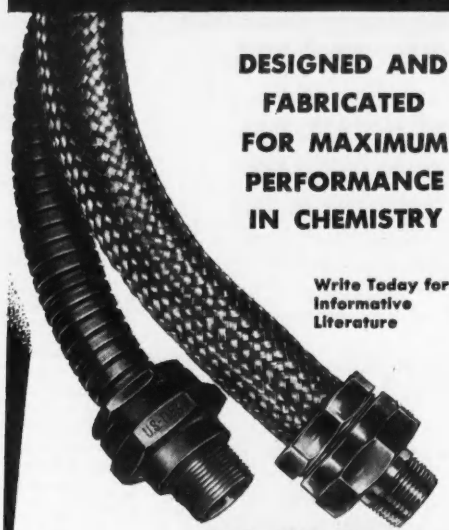
Check 4280 opposite last page.

Specialty chemicals

Catalog of 28 pages lists rare sugars, amino acids, lab reagents, biochemicals. Pfanstiehl Laboratories, Inc., 104 Lakeview Ave., Waukegan, Illinois.

Check 4281 opposite last page.

STAINLESS
Flexible Metal Hose and Components



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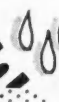

to CORROSION

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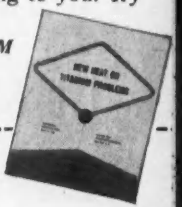
Booklet gives cost saving service records. Tells where you can get titanium mill products and fabricated equipment now.



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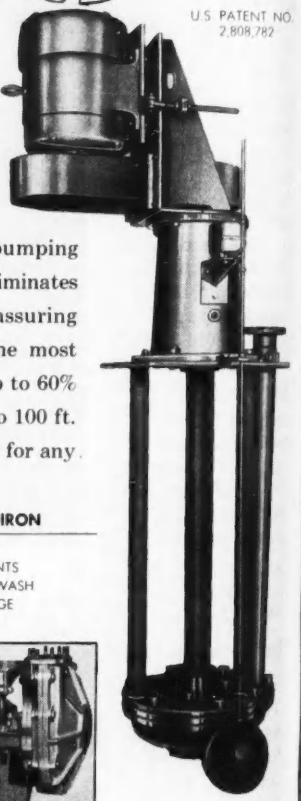

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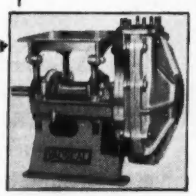
FLOTATION PRODUCTS		

THE VACSEAL PUMP



Precision engineered for rugged use. Exclusive impeller design eliminates gland water.

You sump it . . . we pump it!

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Distributors in Industrial centers of U.S. and Foreign Countries.

2½" GALIGHER ACID-PROOF SUMP PUMP, V-DRIVE LENGTH 48" OR 60"

LEADERS IN EXPERIENCE AND SERVICE

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GALIGHER PRODUCTS: AGITAIR* Flotation Machine, VACSEAL Pump, Geary-Jennings Sampler, Acid-proof Sump Pump, Geary Reagent Feeder, Laboratory AGITAIR* Flotation Machine, Laboratory Pressure Filter, Laboratory Ball Mill, Rubber Lined and Covered Products, Plastic Fabrication.

SP 507

Check 4286 opposite last page

Details evaporators

Evaporators for variety of processing needs are detailed in manufacturer's literature that shows equipment and applications. "An Open Door" — Swenson Evaporator Company, A Division of Whiting Corporation, 15667 Lathrop Ave., Harvey, Ill.

Check 3829 opposite last page.

V-belt drive manual

Packed with easy-to-read information on selection and operation of manufacturer's V-belt drives, 108-page book is arranged in sections covering standard, variable speed and special drives, and others. Engineering drawings and exploded views illustrate technical sections of bulletin which contain comprehensive tables of pre-engineered drives. Bul A661 — Dodge Mfg. Corporation, Mishawaka, Indiana.

Check 4287 opposite last page.

WANT MORE INFORMATION . . .

. . . about things you read about in the New Literature Section?

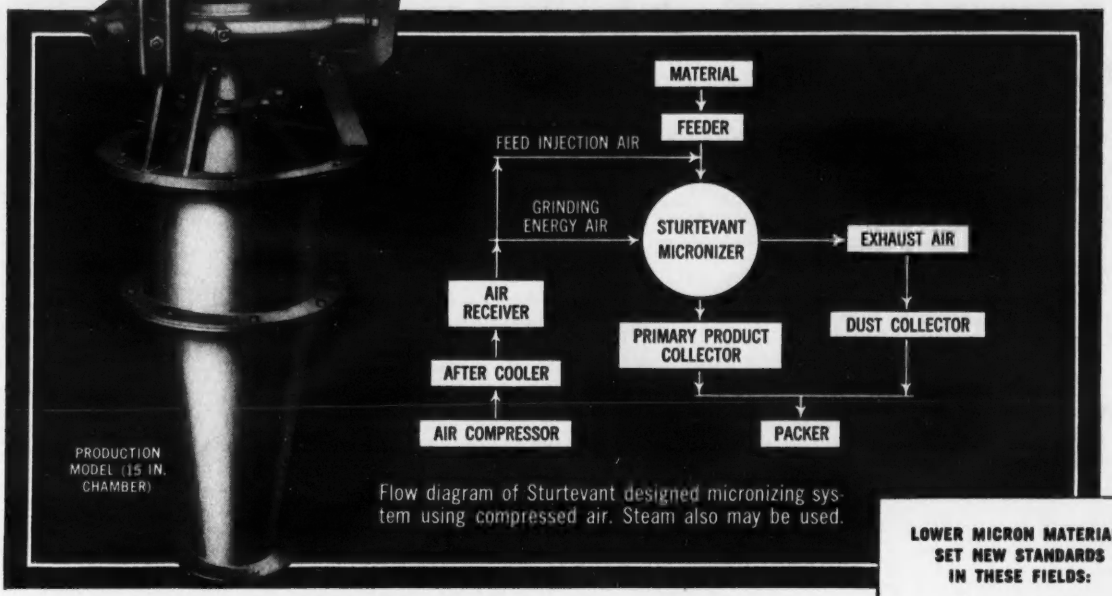
Here's How To Get It

Note the number in last line of each new literature review. Check this key number on Reader Service slip opposite last page of this issue. Fill in the Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you, telling him you'd like a copy of the bulletin. He'll send it direct to you.

Need ½ to 44 Micron Particles?

Sturtevant Micronizers* Reduce, classify in one operation — make 325 mesh obsolete



Flow diagram of Sturtevant designed micronizing system using compressed air. Steam also may be used.

Particles Grind Each Other, Classifying is Simultaneous; No Attritional Heat

One operation. Sturtevant Micronizers grind and classify in a single fluid-jet chamber — provide fines in range from ½ to 44 microns to meet today's increased product fineness requirements. Because of impact action and cool atmosphere, even heat-sensitive materials can be handled.

No moving parts. Particles in high speed rotation, propelled by compressed air or steam entering shallow grinding chamber at angles to periphery grind each other by violent impact. Design provides for instant accessibility, easy cleaning.

Simultaneous classification. Centrifugal force keeps over-size materials in the grinding zone, cyclone action in central section of chamber classifies and collects fines for bagging. Rate of feed and pressure control particle size of fines.

Can combine other processes. Sturtevant Micronizers can be adapted for coating one material with another and for effecting chemical reactions and changes in physical characteristics, while in process of reducing solids to micron size.

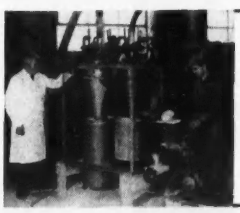
Eight models available. Grinding chambers are in eight sizes, ranging from 2 in. diameter laboratory model (½ to 1 lb. per hr. capacity) to large 36 in. diameter production model (500 to 4000 lbs. per hr. capacity). Send today for fully descriptive literature.

LOWER MICRON MATERIALS SET NEW STANDARDS IN THESE FIELDS:

Pharmaceuticals
Pigments (natural and synthetic)
Copper compounds
Filler materials
Aluminum compounds
Resins
Flour
Sugar
Calcium compounds
Heat sensitive materials
Magnesium compounds
Zinc compounds
Waxes and fatty acids
Fungicides and insecticides

Fluid-Jet Systems For Special Needs

A 30 in. Sturtevant Micronizer is reducing titanium dioxide to particle size under 1 micron at a feed rate of 2250 lbs. per hr. For another firm, a 24 in. model grinds 50% DDT to 3.5 average microns at a solid feed rate of 1200 to 1400 lbs. per hr. A pharmaceutical house is using an 8 in. model to produce procaine-penicillin fines in the 5 to 20 micron range. Iron oxide pigment is being reduced by a 30 in. Micronizer to 2 to 3 average microns at rates of 1000 lbs. per hr. Sturtevant Engineers will help you plan a Fluid-Jet system for your ultra-fine grinding and classifying requirements. *Write today.*



CAN TEST OR CONTRACT MICRONIZING HELP YOU?

Laboratory test-micronizing of your own material, or production micronizing on contract basis, are part of Sturtevant service. See for yourself the improvement ultra-fine grinding can contribute to your product. Or, if you have limited requirements for ultra-fine grinding, Sturtevant's contract micronizing service may be the economical answer. Write for full details.

* REGISTERED TRADEMARK OF STURTEVANT MILL CO.

STURTEVANT

MILL COMPANY 119 Clayton St., Boston 22, Mass.

CRUSHERS • GRINDERS • SEPARATORS • BLENDERS • CONVEYORS • ELEVATORS

Check 4288 opposite last page

MORSE DeLUXE 500
Portable
ROTATOR

• MIXES
• BLENDS
• TUMBLES
• CLEANSES

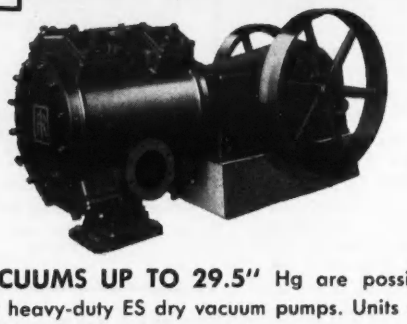
Faster and at less cost!

The patented Morse De Luxe 500 Rotator will handle 1 to 55 gal. containers, weighing to 500 lb. They revolve safely, smoothly, efficiently at 10, 20, 40 rpm on this powerful, compact, portable, motorized unit. Cuts cost of mixing, blending, tumbling, cleansing. Easily moved and loaded by one man. Has ¾" dia. power driveshaft with self-aligning ball bearings. Four adjustable 4" dia. Neoprene-tread drive wheels. Fully enclosed worm-gear drive with 30-1, 15-1, 7½-1 reductions. Weighs 137 lb. Delivered complete with motor, drive mechanism and tipping lever. Write for Free bulletin and catalog, showing full Morse line of Drum and Barrel handling equipment.

MORSE MANUFACTURING CO. INC.
757 West Manlius St. East Syracuse, N. Y.

Check 4289 opposite last page

I-R DRY VACUUM PUMPS



VACUUMS UP TO 29.5" Hg are possible with heavy-duty ES dry vacuum pumps. Units are now in use on nearly every job where a dry vacuum pump can be applied. Equipped with efficient I-R Channel Valves. Available with V-belt motor drive or with an additional cylinder in tandem for steam drive.

Eight standard sizes from 180 to 2800 cfm piston displacement single-stage, vacuums to 28.5"; or 90 to 1400 cfm two-stage, vacuums to 29.5" (referred to a 30" barometer). Send for descriptive folder.

Ingersoll-Rand Dept. PV
1-604
11 Broadway, New York 4, N.Y.

OTHER VACUUM PUMPS FROM 6 TO 51,000 CFM PISTON DISPLACEMENT

Check 4290 opposite last page

NEW LITERATURE

Rotary vacuum filter

Standard rotary vacuum filter that can be "tailored" to fit specific job is described and illustrated in 24-page bulletin. Operation, construction, installation, and applications are covered. Bul 103-B — Filtration Engineers, Inc., subs. of American Machine & Metals, Inc., 155 Oraton Street, Newark 4, New Jersey.

Check 4291 opposite last page.

Spray-on stencil ink

Pocket-size folder of four pages describes manufacturer's line of stencil inks that spray on, eliminating leaky, messy fountain brushes and ball pots. Typical applications of handy aerosol container are illustrated. Form 141 — Reynolds Ink, Inc., 4500 Euclid Avenue, Cleveland 3, Ohio.

Check 4292 opposite last page.

Spark-ignition engine

Bulletin of eight pages points out and illustrates features of manufacturer's spark-ignition engines for applications such as oil-well drilling, pipeline pumping, and industrial machinery powering. Form D755 — Caterpillar Tractor Co., Peoria, Ill.

Check 4293 opposite last page.

Adjustable-speed drives

Illustrated bulletin of 16 pages describes line of packaged, DC, adjustable-speed drives available from 3 through 150 hp, 220, 440, 550 volts, 3-phase AC, 60-cycle. Bul GEA-6643 — General Electric Company, Schenectady 5, N. Y.

Check 4294 opposite last page.

Polyvinyl alcohol

Twenty-page technical manual fully tells about properties and uses of polyvinyl alcohol. "Gelvatol" — Dept. FE, Shawinigan Resins Corp., Springfield 1, Mass.

Check 4295 opposite last page.

For Acid-Proof *floors*
in Industrial and Processing Plants

SAUEREISEN No. 54

Test it Yourself
Special trial order, 100 lb. lot, only
$12

Here's a revolutionary Pour-Lay Concrete that resists acids, salts, solvents, water, oil and high temperatures. May be poured into place and leveled off, ready for use in hours. Can be applied as a topping over existing floors. Also recommended for tanks, pits, vats, foundations, sewers, etc.

We invite your inquiries without obligation. 54A

Sauereisen Cements Co., Pittsburgh 15, Pa.

Check 4296 opposite last page

What's
A "New Solution"?

It's an article in CHEMICAL PROCESSING describing a new way of solving a tough plant operating problem. In each issue you will find specific "case histories" showing how these processing problems were solved.

Each article states the operating problem . . . explains the process used and gives details of how problem was solved . . . shows results secured.

Take a look at "New Solutions" articles in this issue — they might suggest a "solution" for some of your tough processing problems.

Lift truck bulletins

Two four-page bulletins, one covering specifications and drawings, and the other illustrating and describing features, provide data on manufacturer's new concept of an electric fork lift truck. The truck is devoid of upright channels, chains, and sprockets found on conventional high-lift trucks. Bul 6501A and 6503A — Automatic Transportation Company, 149 W. 87th St., Chicago 20, Ill.

Check 4297 opposite last page.

Nuclear activities

Company's atomic power department which provides completely integrated service for research, design, engineering, and manufacturing of mechanical systems and components for atomic energy industry is covered in 16-page booklet. "Atomic Power Department" — Atomic Power Department, United Shoe Machinery Corporation, Balch St., Beverly, Mass.

Check 4298 opposite last page.

Features lab equipment

Manufacturer's 20-page catalog contains illustrated descriptions of laboratory and industrial equipment including electric furnaces, temperature controllers, and pyrometers. Cat 57 — Thermo Electric Manufacturing Co., 476 Huff St., Dubuque, Iowa.

Check 4299 opposite last page.

Aluminum tanks, vessels

Booklet of 16 pages on use of aluminum for tanks and vessels serves as basic technical guide to design, fabrication, and applications. More than 100 general types of chemicals for which aluminum is particularly advantageous are listed. Form CP 15-10—757 — Reynolds Metals Company, 2500 South Third St., Louisville, Kentucky.

Check 4300 opposite last page.

No Repairs in a Full Year of Round-the-Clock Service

In the chlorinated products division of Diamond Alkali Company at Painesville, Ohio, these LaBour Type G pumps—purchased in 1948—are on continuous duty, lifting chlorinated solutions to the cooling towers above the mixing tanks. Each of the four pumps lifts about 120,000 gallons per day, to dissipate heat produced by introduction of the chlorine into the process of manufacturing chlorowax, carbon tetrachloride and anhydrous hydrochloric acid. Ten other LaBour pumps serve other divisions of the Painesville plant.

In 24-hour service atop the 15,000-gallon mixing tanks, the LaBour pumps take a beating, but they deliver the work they were bought to do. Sometimes a full year goes by without the necessity for any repairs or replacement parts. LaBour Type G is packingless, so there is never any need for servicing to prevent packing leaks.

If you are looking for this kind of dependable, low-cost service in your liquid moving operations, get in touch with LaBour.

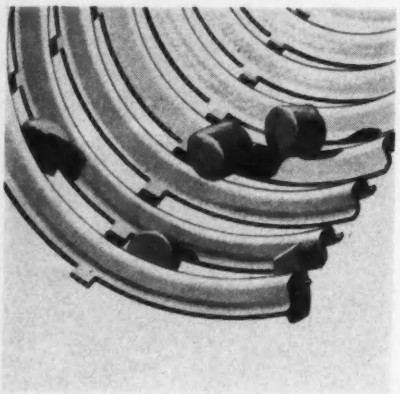
ORIGINAL MANUFACTURERS OF THE SELF-PRIMING CENTRIFUGAL PUMP

LABOUR

THE LABOUR COMPANY, INC., Valparaiso, Indiana, U.S.A.

Check 4301 opposite last page

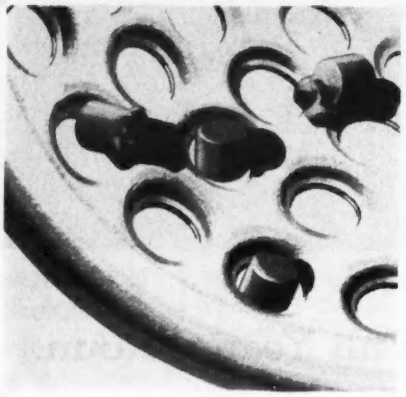
Lately more plastics materials are being sized and separated by Hart-Carter machines

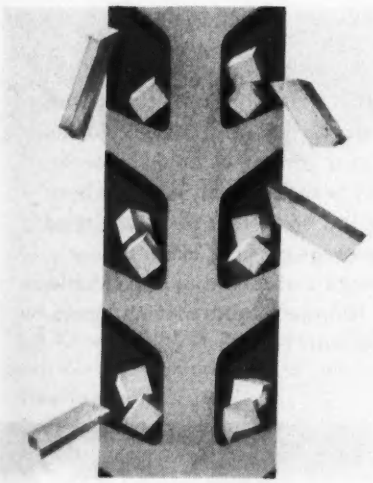


CARTER GRADERS PERFORM THICKNESS, WIDTH SEPARATIONS

For sizing or separating free-flowing granular materials by *thickness*, Carter Precision Graders use revolving cylinders with *slotted perforations at the bottom of grooves*. Saddles between these grooves upedge the materials presenting them to the slots in an edgewise position. The thinner pieces pass through and the thicker pieces pass over and are conveyed to the end of the machine.

For *width* sizing or separating the Precision Graders use revolving cylinders with *round recessed perforations*. The recess causes the materials to be presented to the round perforations in an upended position. Narrow pieces pass through and wider pieces pass over for discharge at the end of the cylinder.





CARTER SEPARATORS ASSURE POSITIVE LENGTH SEPARATION

Carter Disc Separators contain a series of discs mounted on a revolving horizontal shaft. Each disc has hundreds of undercut pockets which select or reject plastics or similar materials according to *length*. As the discs revolve through a mixture of materials, the pockets lift out the shorter pieces. The longer pieces, too long to be held in the pockets as they rise, drop away from the discs.

Write today for complete information and descriptive folders on Hart-Carter machines.

HART-CARTER CO.
677 Nineteenth Ave. N.E. • Minneapolis 18, Minn.

Check 4302 opposite last page

NEW LITERATURE

Filter cloth tech data

Bulletin of eight pages presents data covering chemical-resistance, corrosion-resistance, abrasion-resistance, and available yarn forms of over 12 types of filter cloth. Bul 10 — The National Filter Media Corporation, 1717 Dixwell Ave., New Haven, Conn.

Check 4303 opposite last page.

Bulk material handling

A bulk material handling system featuring the use of aluminum bins is described in detail in 20-page catalog. Automatic filling and discharging stations, inter- and intra-plant applications, and specifications of equipment are covered. Cat 6 — Tote System, Inc., Beatrice, Neb.

Check 4304 opposite last page.

Controller catalog

Temperature recorders, controllers, indicators, control systems, and accessories are briefly described and illustrated in manufacturer's four-page bulletin. Bul COM — West Instrument Corp., 4363 W. Montrose Ave., Chicago 41, Illinois.

Check 4305 opposite last page.

Chromatographic adsorbents

Guide and price list of four pages on adsorbents for use in all chromatographic instruments contains advice on proper selection for class of sample and analysis to be made. Bul 835 — Burrell Corporation, 2223 Fifth Ave., Pittsburgh 19, Pa.

Check 4306 opposite last page.

Safety shoes

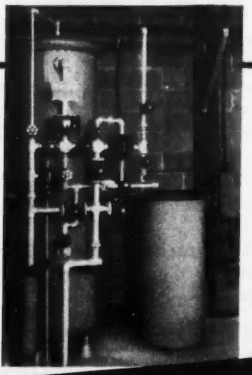
Details on 72 different safety shoe styles are presented in 16-page catalog. Safety shoe cat — Lehigh Safety Shoe Co., Emmaus, Pa.

Check 4307 opposite last page.

21¢ PER 1000 GALLONS FOR

Demineralized water better than

DISTILLED WATER



ELGIN
Single-Tank, Mixed-Bed
DEIONIZER

What are you paying for distilled or evaporated water? The Elgin Ultra-Deionizer has brought the cost of water, freer from mineral impurities than distilled water, down to the low price quoted above (based on 10 grain water).

It removes all ionizable impurities . . . including CO_2 and silica.

Low investment and operating cost.

Requires less space . . . thanks to exclusive "double-check" design.

ELGIN WATER CONDITIONING SINCE 1908

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Write for Bulletin 512

Zeolite Water Softeners
Dealkalizers
Deaerating Heaters
Filters of all types
Water Conditioning Products for every need.

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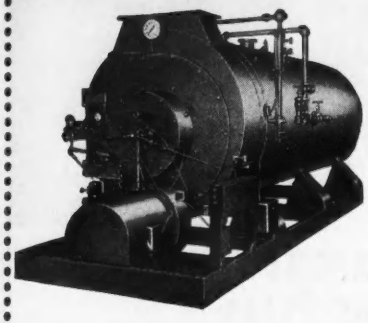
Check 4308 opposite last page

CYCLOTHERM...
EASY to INSTALL
ECONOMICAL to OPERATE



Low-cost steam. You'll get a new idea of low-cost steam production when you install a Cyclotherm Steam and Hot Water Generator. It requires no costly stack—operates with a simple flue. It needs no special foundation or excavation. And since the Cyclotherm is up to one-third smaller than other package steam generators, it fits into the smallest possible boiler room space. Can be easily relocated in time of expansion.

Low operating costs. One maintenance man can take care of a Cyclotherm—parts are easy to get at, easy to clean. Burns gas and/or oil, with a quick changeover to whichever fuel is cheaper. Automatic controls save fuel by regulating firing rates to suit the need for steam.

A complete package. Cyclotherm is a complete package boiler, shipped ready to operate. Guarantees a minimum of 80% efficiency in two passes. For full information, write Cyclotherm Division, National-U.S. Radiator Corp., 29 E. First St., Oswego, N.Y. Models from 18 to 750 hp; 15 to 200 psi.

YEARS AHEAD IN STEAM GENERATION
CYCLOTHERM
STEAM AND HOT WATER GENERATORS

Clip to Your Letterhead:

Please send me your free booklet, Cyclotherm Cyclonic Combustion

Check 4309 opposite last page

NEW LITERATURE

Bonding rubber

Handy 24-page illustrated booklet describes bonding of molded mechanical rubber to metal (including aluminum), compounding of rubber for tailor-made jobs, and uses of metals when cushioned with rubber where metal-on-metal cannot be used. "The Henry Process" — Henry Engineering Company, Moline, Ill.

Check 4310 opposite last page.

Hi-impact thermoplastic

File-folder gives current detailed information on five cycolac high-impact thermoplastic resins. "Why Cycolac" — Marbon Chemical, Div. of Borg-Warner Corp., 7165 Chicago Ave., Gary, Ind.

Check 4311 opposite last page.

Filling machine manual

Operating manual for manufacturer's two line filling machine contains 16 exploded drawings, detailed operating instructions, and points on maintenance. Operating manual, Type 19S — Hope Machine Co., 9400 State Rd., Philadelphia 14, Pa.

Check 4312 opposite last page.

Silicone guide

Illustrated, 16-page reference guide describes over 150 commercially available silicone products. Includes charts, tables, graphs, and data on properties, performance. Bul 1-113 — Dow Corning Corp., Midland, Mich.

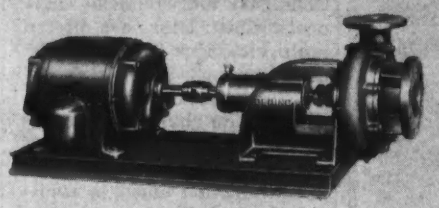
Check 4313 opposite last page.

Cathodic protection cable

Two types of cathodic protection cables are described and illustrated in detail in four-page bulletin which presents diagrams of typical underground installations. Bul RCP 1110 — Rome Cable Corporation, Rome, N. Y.

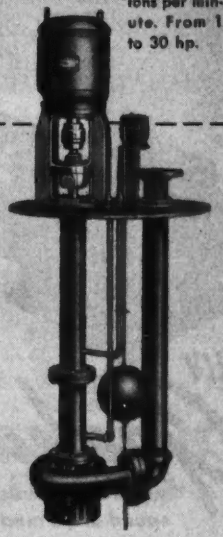
Check 4314 opposite last page.

PUMPS FOR EVERY INDUSTRY



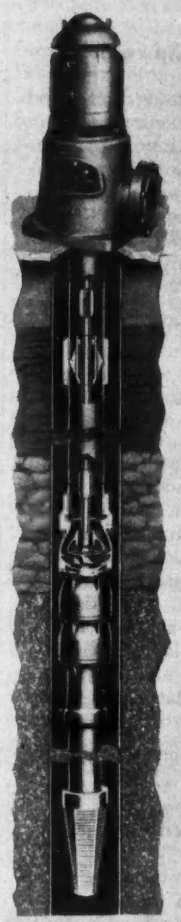
END-SUCTION CENTRIFUGAL PUMPS . . . two ball bearing type. Semi-open non-clogging impeller. Separate liquid end in standard iron or corrosion-resistant material. Optional features adapt to many requirements. Bulletin 4011.

"MOTOR MOUNT" CENTRIFUGAL PUMPS . . . pumps range from 1½" to 5" discharge . . . capacities to 1200 gallons per minute. From 1 to 30 hp.



VERTICAL SUMP PUMPS . . . single and duplex units, designed for wet pit service. Efficient, dependable with the latest construction and design features.

MULTI-STAGE HIGH PRESSURE VERTICAL CENTRIFUGAL PUMPS . . . designed for general industrial use. Handles liquids which are non-corrosive to iron and bronze. Ideal for boiler feed service.



VERTICAL TURBINE PUMPS . . . for wells 4 to 16 inches I.D. Capacities 15 to more than 3500 G.P.M. Bulletin No. 4700.

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THE DEMING COMPANY
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Address _____

Company _____

City _____ *Zone* ____ *State* _____

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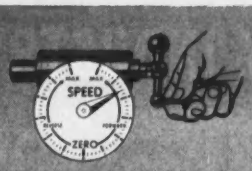
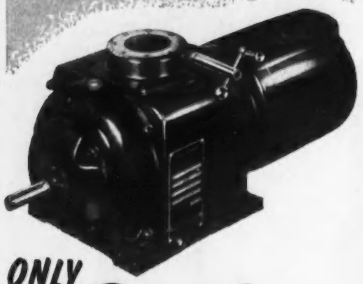


GUARANTEED GREATER ACCURACY

than any other Variable Speed Drive



ONLY Graham

most reliable variable speed drive made

offers these...

BIG FOUR FEATURES!

1 UNLIMITED SPEED RANGE — from any desired maximum speed to zero, including reverse, without stopping motor.

2 UNMATCHED ACCURACY — of speed setting and re-setting, and of speed holding.

3 ULTIMATE in SIMPLICITY and COMPACTNESS — a straight line extension of a standard induction motor — or available without motor.

4 AUTOMATED SPEED CONTROL — control tension, proportion, synchronization, etc. from any control signal; 3 to 15 PSI, .5 to 5 ma, potentiometer, frequency, or binary signal from punch cards, tapes, or computers.

SEE OUR CATALOG IN SWEET'S PRODUCT DESIGN FILE OR WRITE FOR COPY

All this backed by PROVED PERFORMANCE to do a better job for LESS MONEY!

GRAHAM TRANSMISSIONS, INC.
Dept. C P, Menomonee Falls, Wis.

Check 4316 opposite last page

NEW LITERATURE

Glycerine production chart

Chemistry and chemical engineering instructors are offered multicolor, 19 x 28" wall chart diagramming production of glycerine from fats and propylene. The chart, intended as classroom study aid, also lists properties and uses. Glycerine production chart is available free of charge to instructors who submit college or school letterhead requests direct to Glycerine Producers' Association, 295 Madison Ave., New York 17, N. Y.

Check 4317 opposite last page.

Laboratory pulp refiner

Installation photographs and dimensional drawings aid in description of laboratory refiners for research investigation of pulping and wood utilization processes. Bul 17A — Pulp and Paper Mill Div., Sprout, Waldron & Company, Inc., Muncy, Pa.

Check 4318 opposite last page.

Valve catalog

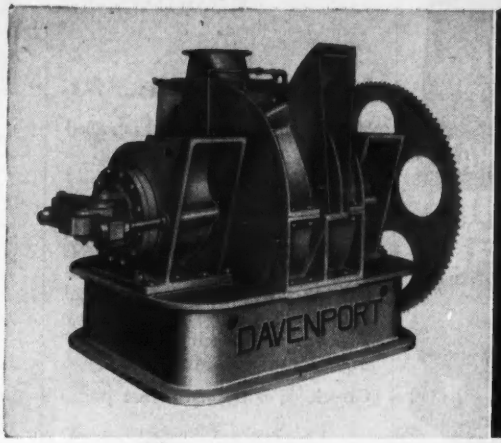
Manufacturer's eight-page catalog contains information on five basic models of valves. Ball cam, palm button, hand lever, locking hand lever, and mechanical link clevis valves are ¼" pipe size for two- or three-way air operation to 150 psi. "Idea starter" control circuits are also shown. Cat 262 — Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.

Check 4319 opposite last page.

Locates line, cable faults

Data sheet of two pages describes use of instrument in locating line and cable faults in signal communication circuits. A schematic diagram illustrates operation of Type U Test Set, and complete specifications are listed. Data sheet E-53 (11) — Leeds & Northrup Company, 4934 Stenton Ave., Philadelphia 44, Pennsylvania.

Check 4320 opposite last page.



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PRESSING – DRYING and COOLING Equipment
Continuous De-Watering Presses
ROTARY DRYERS
Steam Tube, Hot Air and Direct Fire
Atmospheric DRUM DRYERS
ROTARY COOLERS
Water and Air

The New 1B "DAVENPORT" Continuous De-Watering Press

This new press was designed and built to withstand the extremely heavy service required in the Pulp and Paper Field. This same press can be adapted to many other products that have a fibrous nature. This press can also be readily adapted to products having a highly corrosive element.

Let our engineers consult with you on your Pressing, Drying, and Cooling problems, or send for complete Catalog C.

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We don't make pop-up toasters or television sets—our business is Semiconductor Power Conversion Equipment and Systems. This intense specialization assures you of the best rectifier equipment it is possible to build—plus the flexibility of modifying designs to meet specific, exacting requirements. Such valuable EXTRAS are evident in every Sel-Rex Rectifier installation. Send for FREE "GUIDE" to Industrial Rectifier Equipment.

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Rectifier Division

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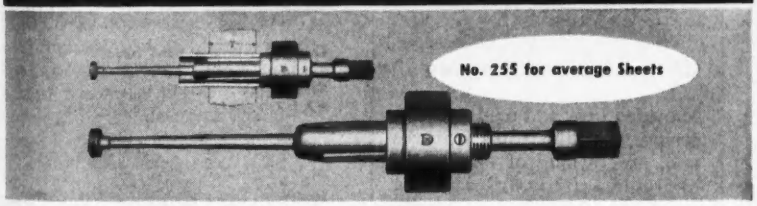
Representatives in Principal Cities

"Complete Semiconductor Power Conversion Systems for any AC to DC application"

Check 4323 opposite last page

IDEAL

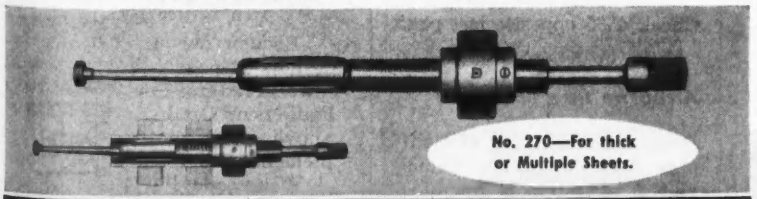
WIEDEKE Precision-Built Tube Expanders



Ball Bearing Adjustable Thrust Collar Tube Expanders are made for Tubes ¼" diameter and larger.
Recommended for use with any Controlled Rolling Motor for uniform expansion of Tubes.

See your Dealer or write us for Bulletin.

For Rolling—Heat Exchanger, Condenser and other Heat-Transfer Tubes.



THE GUSTAV WIEDEKE COMPANY

DAYTON 1, OHIO

Check 4324 opposite last page

NEW LITERATURE

Fatty acids, oils

Specs, uses, and compositions of over 180 fatty acids, derivatives, and industrial oils are in eight-page bulletin. Fatty acid, oils bul — Chemical Div., Armour and Co., 1355 W, 31st St., Chicago 9, Ill.

Check 4325 opposite last page.

Metal containers

Illustrated 20-page bulletin describes company's metal container manufacturing facilities. Specifications of various metal containers company supplies are listed, and drawings show construction. Bul B800 — Container Div., The Sherwin-Williams Co., Cleveland 1, Ohio.

Check 4326 opposite last page.

Trimethylolethane uses

Five pages summarize research on trimethylolethane, a solid trihydric alcohol, which is used in manufacture of alkyds, drying oils, polyesters, resins, and plasticizers. TME bul — Heyden Newport Chemical Corp., 342 Madison Ave., New York 17, New York.

Check 4327 opposite last page.

Entrainment separators

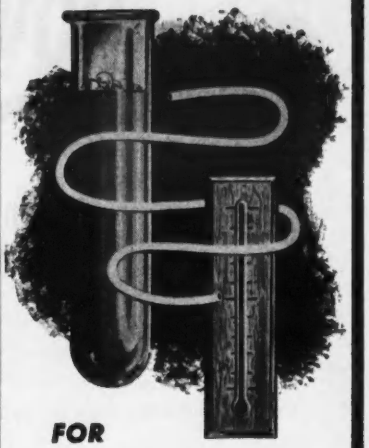
Bulletin of four pages presents principles of operation, engineering and installation data, and typical applications of manufacturer's entrainment separators and mist eliminators. Bul 21 — Otto H. York Co., Inc., 6 Central Ave., West Orange, N. J.

Check 4328 opposite last page.

Chemical resistance of rubber gloves

Gloves made of five types of molded rubber and synthetic materials are introduced in 8-page bulletin. Bul 1310-2 — Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.

Check 4329 opposite last page.



FOR

HIGH TEMPERATURES

CORROSIVE STREAMS

FLEXIBLE APPLICATIONS

USE PF

FLEXIBLE TUBING

MADE FROM

TEFLON*

A unique combination of properties are available to you when you use PF flexible tubing made from Teflon*:

- widest service temperature of any plastic (−450°F to +500°F)
- complete chemical inertness
- flexibility and toughness even at the temperature of liquid oxygen.
- lowest coefficient of friction of any solid material
- very low permeability
- available with flare, insert and ferrule type fittings

These properties, plus our carefully controlled extrusion techniques, make PF's flexible tubing made from Teflon* ideally suited for chemical, pharmaceutical, petroleum, hydraulic hose and similar applications requiring unique tubing properties.

Write, wire or call for information on special sizes, wall thicknesses and colors and for PF heavy wall tubing, spaghetti and rod stock.

PENNSYLVANIA FLUOROCARBON CO., INC.

1115 N. 18th Street, Phila. 4, Pa. EVergreen 6-0603

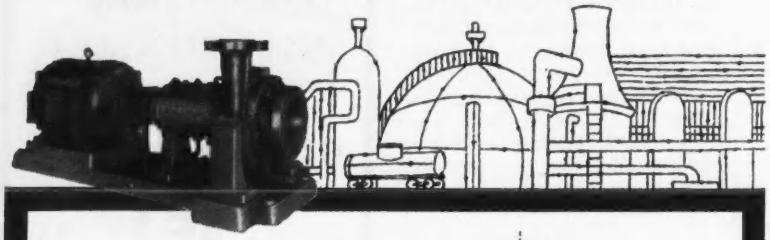
*Teflon is DuPont trade name for Tetrafluoroethylene resin

Check 4330 opposite last page

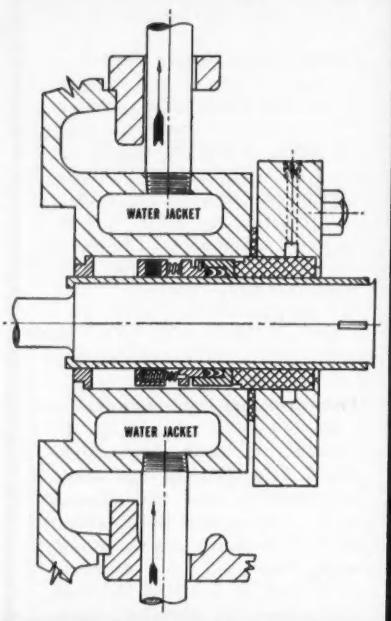
HOW! PUMP USERS—

Avoid Stuffing Box Leakage of Expensive Liquids on High Temperature Service —with a Simple Standard Seal

Dean Brothers Pumps was first to offer a complete line of high temperature centrifugal pumps with a mechanical seal of standard manufacture. This permits use of standard mechanical seals on heat transfer and other high temperature processes up to + 750° F.



- Water jacket encircles full length of extra deep stuffing box . . . keeps temperature well below thermal limits of seal without cooling the liquid in the casing.
- Stuffing box accommodates mechanical seal or packing, interchangeably, without modification. Pumps can be changed from packing to mechancial seal, in the field, with no alterations.
- Cooling water for pump can be taken directly from plant supply. No special or auxiliary equipment is needed.
- Large shaft diameter and short shaft overhang reduce shaft deflection . . . eliminate wear on mechanical seal.



Like to know more about Dean Brothers mechanical stuffing box sealing for high temperature service? Write for Circular No. 189 or our recommendations for your particular application.

DEAN BROTHERS PUMPS INC.

EST. 1859

323 West 10th St., Indianapolis 7, Ind.

EXPORT OFFICE: 50 CHURCH ST., NEW YORK 7, N.Y. • CABLE ADDRESS—BROSITES NEWYORK

Check 4331 opposite last page

NEW LITERATURE

Filter membranes

Characteristics and major applications of manufacturer's filter membranes for analysis of liquid- and gas-dispersed particles and micro-organisms are summarized in 16-page illustrated booklet. "1957 Supplement" — Millipore Filter Corporation, 36 Pleasant St., Watertown 72, Mass.

Check 4332 opposite last page.

Non-ferrous metals

Tabbed, 60-page copper and brass warehouse stock list is handy, informative booklet for purchasers of non-ferrous metals. Warehouse stock list — Dept. RS, The American Brass Company, Waterbury 20, Conn.

Check 4333 opposite last page.

Epoxy resin finishes

Formulation and improvement of epoxy resin finishes with 2-nitropropane is discussed in four-page data sheet. TDS 23C — Commercial Solvents Corp., 260 Madison Ave., New York 16, New York.

Check 4334 opposite last page.

Lift truck power steering

Manufacturer's folder describes and illustrates features and operation of improved hydraulic power steering available on large-capacity line of fork lift trucks. According to estimates, steering effort is reduced at least 80%. Power steering folder — Towmotor Corp., 1226 East 152nd St., Cleveland 10, Ohio.

Check 4335 opposite last page.

Airborne flow regulator

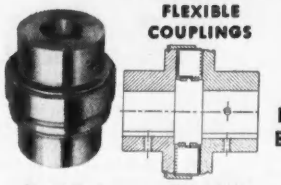
Diagrams and charts of eight-page bulletin explain principles of operation of manufacturer's flow regulators for airborne equipment. Data sheet 1.00 — Waterman Engineering Company, 725 Custer Ave., Evanston, Ill.

Check 4336 opposite last page.

Lovejoy

POWER TRANSMISSION EQUIPMENT EASILY INSTALLED, MAINTENANCE-FREE

FLEXIBLE COUPLINGS



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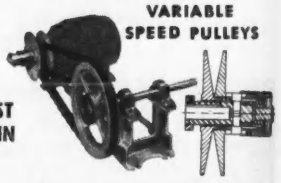
Bores (max.).....⅝" to 9½"
O.D. .....⅝" to 21½"
Wt. .....½ oz. to 1500 lb.
H.P. .....1/20 to 3000
Torque (static).1½ to 5100 ft.-lbs.

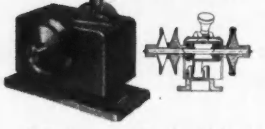
VARIABLE SPEED PULLEYS



REQUEST BULLETIN 118

Bores (max.).....½" to 1⅝"
O.D. .....3" to 13⅜"
Belt Sizes.....A to 2¾ TW
Speed Ratios.....1-1 to 8-1
H.P. (1750 rpm.).....¼ to 15

SELECT-O-SPEED TRANSMISSIONS



REQUEST BULLETIN 118

Controls.....Lever or Hand Wheel
Belt Sizes.....A to C
Speed Ratios.....1-1 to 10-1
H.P. (1750 rpm.).....½ to 7½

UNIVERSAL JOINTS

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Bores.....¼" to 2"
Hub Dia. .....½" to 4"
Static Torque 340 to 130700 in.-lbs.
H.P. (100 rpm.).....½ to 207

Request our new 12-page Power Transmission Equipment Catalog showing the complete Lovejoy line. Write today!

LOVEJOY FLEXIBLE COUPLING CO.

4808 W. Lake St. • Chicago 44, Ill.

Check 4337 opposite last page

Highway film report

Color motion picture designed to explain US highway program to the public has recently been released by manufacturer in cooperation with the US Dept. of Commerce, Bureau of Public Roads. Narrated by commentator Walter Cronkite, the 23-minute film illustrates step-by-step how 41,000-mile, $50-billion program will be planned, built, and used. "The Road Ahead" — Caterpillar Tractor Company, Peoria, Ill.

Check 4338 opposite last page.

Metering pump data

Manufacturer's booklet gives inside story of precision, versatility, and reliability of metering pump for pressures up to 500 psi; available with either Teflon-faced diaphragm or metallic bellows. Booklet 302 — Hills-McCanna Company, 4571 West Touhy Ave., Chicago 30, Ill.

Check 4098 opposite last page.

Covers mixing operations

Manufacturer's four-page bulletin is devoted entirely to continuous mixing operations. Operation, applications, and design features of mixers are thoroughly explained. "Engineering Report on Mixing" — Rietz Manufacturing Co., West Chester, Pa.

Check 4339 opposite last page.

Nuclear, specialty metals

Bulletin of five pages describes melting, fabricating, testing, and quality-control facilities available in company's nuclear and specialty metals plant. Designed primarily for manufacture of atomic fuel elements and components, plant also fabricates and clads rare and refractory metal parts. Nuclear, specialty metals plant bul — D. E. Makepeace Co., Pine and Dunham Sts., Attleboro, Mass.

Check 4340 opposite last page.

Catalogs lab instruments

Catalog of eight pages lists manufacturer's laboratory instruments including microscopes, chromatography cabinets, sulfur apparatus, and gas chromatographs. "New and Recent Devices" — Aloe Scientific, Div. of A. S. Aloe Co., 5655 Kingsbury, St. Louis 12, Mo.

Check 4341 opposite last page.

Chemical-resistance charts for safety clothing

Six-page booklet gives a comparison of chemical resistance and other safety factors for nine synthetic fabrics used in safety clothing. "Chemical-resistant Charts" — Milburn Co., 3246 E. Woodbridge St., Detroit 7, Mich.

Check 4342 opposite last page.

Chem-resistant hose

Facts and figures concerning chemically resistant, high- and medium-temperature hose and hose assemblies are contained in 12-page bulletin. Chem-resistant hose bul — Resistoflex Corporation, Roseland, New Jersey.

Check 4343 opposite last page.

Case studies on handling

"Packaged" presentation contains seven case studies of how various manufacturers solved production, storage, and shipping problems with modern material handling equipment. "Case Studies" — Lewis-Shepard Products, Inc., 125 Walnut St., Watertown 72, Massachusetts.

Check 4344 opposite last page.

Data on vinyl plastisol

28 pages describe preparation, processing of vinyl plastisols from Opalon 410, stir-in vinyl resin. Vinyl Plastisol bul — Dept. SV, Monsanto Chemical Co., Springfield, Mass.

Check 4345 opposite last page.

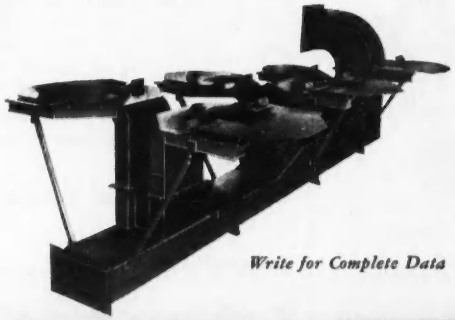
Van-Cor

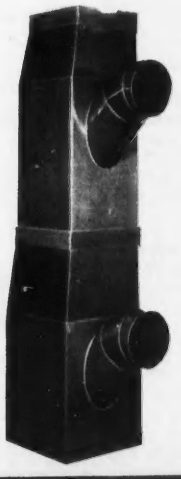
90 and H Joining Strips

Revolutionary Method of Connecting PVC Sheet Stock — Van-Cor 90 and H joining strips use solvent welding to obtain maximum joint efficiency. They save time and money compared with hot air welding. Skilled welders are unnecessary—your own men can fabricate readily. On major installations using these Van-Cor strips, job costs have been cut over 30%!

Two Shapes—Three Sizes—Use 90 degree joining strips for making corners, H strips in a single plane. They handle sheet in ⅛", 3/16" and ¼" gauges. Both shapes available in Van-Cor 1 (normal impact) and Van-Cor 2 (high impact). Standard strip length is 10 feet.

For flanges and stiffeners of fabricated sections, extruded structural angles in 10 foot lengths are available in sizes 1½" x 1½" x 3/16" and 2" x 2" x ¼".





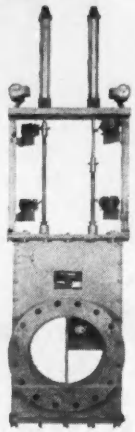
Write for Complete Data

INDUSTRIAL DIVISION OF...
COLONIAL PLASTICS MFG. CO.
Subsidiary of THE VAN DORN IRON WORKS CO.
2685 EAST 79TH STREET CLEVELAND 4, OHIO

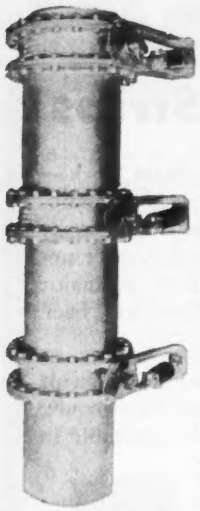
Check 4346 opposite last page

ROCKWELL VALVES

FOR UNUSUAL OPERATIONS



Double-seated "Kwikleen" slide valve for tank divided into two parts for different materials; blades are individually operated by air cylinder, solenoids and limit switches.



Three pneumatically-operated butterfly valves mounted in a cylindrical chute for automatic, consecutive filling and discharging of measured quantities of solid materials; equipped with sequence control, three-circuit timer and interlocked limit switches.

Stainless steel butterfly valve for line carrying nitrogen with nitric acid mist at 77 psig and 1000° F. max., furnished with cooling fins, air operator and valve disc positioner, etc.

These are representative of unusual (as well as usual) Rockwell valves of many types for solving fluid control problems. What's yours?

W. S. ROCKWELL COMPANY
2208 ELIOT STREET
FAIRFIELD, CONN.

Check 4347 opposite last page

NEW LITERATURE

Nuclear safety service

Scientific and engineering service providing independent reactor and radiation hazard evaluation is discussed in 16-page booklet. Scope of service, method of operation, and information on personnel and facilities are included. "Nuclear Safety" — Holmes & Narver, Inc., 828 South Figureroa St., Los Angeles, California.

Check 4348 opposite last page.

Peracetic acid

Synthesis of peracetic acid and epoxides, reactions of epoxides, and data on derivatives are in this 48-page brochure. Bibliography has 76 entries. "F-40108" — Union Carbide Chemicals Co., 30 E. 42nd St., New York 17, N.Y.

Check 4349 opposite last page.

Magnetic flow meter

Manufacturer's catalog discusses principle of operation of magnetic flow meter and gives advantages and specifications. Cat 10D1416 — Fischer & Porter Company, 461 Jacksonville Road, Hatboro, Pennsylvania.

Check 4350 opposite last page.

Theory of screening

Applications, specifications, and theory of screening practice are presented in eight-page bulletin on manufacturer's heavy duty series of vibrating screens. Bul 757 — Stephens-Adamson Manufacturing Co., Ridgeway Ave., Aurora, Ill.

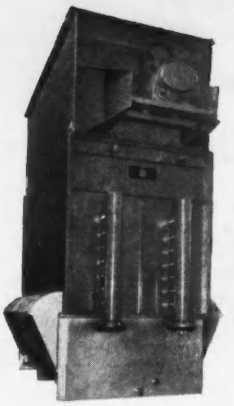
Check 4351 opposite last page.

Industrial ladders

A wide variety of industrial ladders which provide maximum safety are described and illustrated in 34-page Catalog 5758 — Duo-Safety Ladder Corp., Oshkosh, Wis.

Check 4352 opposite last page.

REDUCE OPERATING COST of VACUUM SYSTEMS with this "AERO" (air-cooled) VAPOR CONDENSER



Niagara Aero Vapor Condenser. This compact machine may be installed directly above stripping column or vacuum evaporator.

With free air the cooling medium you use the least water, evaporated in the air stream. You save the cost and pumping of large volumes of condensing water.

Air-vapor subcooling reduces mixture evacuated from the system, saving in the operation of steam ejector or vacuum pump.

This *air-cooled* condenser gives you more capacity than other types at a substantial saving of steam and power. Water supply, scaling treatment and disposal problems are eliminated.

You get pure condensate, an improved product; often make a profit on recovery of residues now wasted. There can be no contamination of your product at any time; it never touches raw water. Condensing, of water, of solvents or of your product, is simplified; you have one, compact, easily maintained unit replacing both cooling tower and barometric or surface type condenser.

Maintenance expense is low. Balanced Wet Bulb Control provide precise, year 'round adjustment of capacity to load.

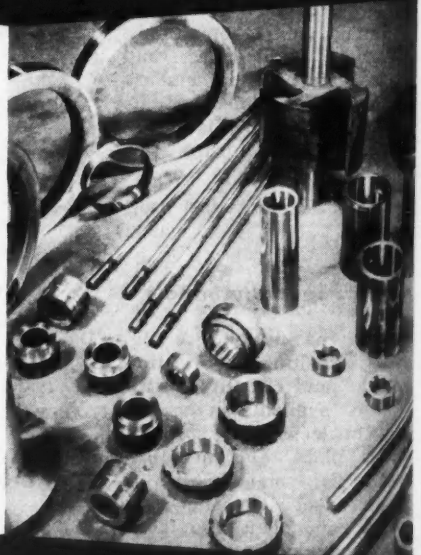
Constant temperature, uniform products and maximum production 12 months a year are assured. Unit capacities up to 15 million BTU.

Write for full information. Ask for Bulletin 129R

NIAGARA BLOWER COMPANY
Dept. CP-3, 405 Lexington Ave., New York 17, N.Y.
Niagara District Engineers in Principal Cities of U. S. and Canada

Check 4353 opposite last page

Wear, Corrosion And Heat Resistant Welded HARD-FACED Components Produced To Specifications



■ Whenever your product requires special components with superior wear qualities, precision surface finish that provides dependable long life service under severe operating conditions, specify Cleveland Hard Facing.

As specialists in the application of welded hard facing metal overlays, we are completely equipped and qualified to economically produce hard faced components to meet your specifications. For practical assistance on your application, call on one of our specialists.

Write for detailed literature.

Application Specialists Of Wear, Corrosion And Heat Resistant Overlays
Cleveland Hard Facing, Inc.
3047 Stillson Avenue • Cleveland 5, Ohio

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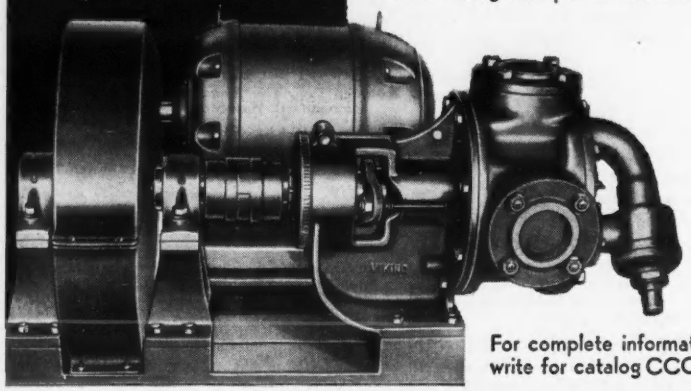
for RUGGED PUMPING
Specify VIKING Heavy Duty PUMPS

When jobs require rugged pumping, you can depend upon Viking Pumps. All are fast self-priming and positive in action. Models are built to handle liquids ranging from LP-Gas up to those of a viscosity of 2,500,000 SSU.

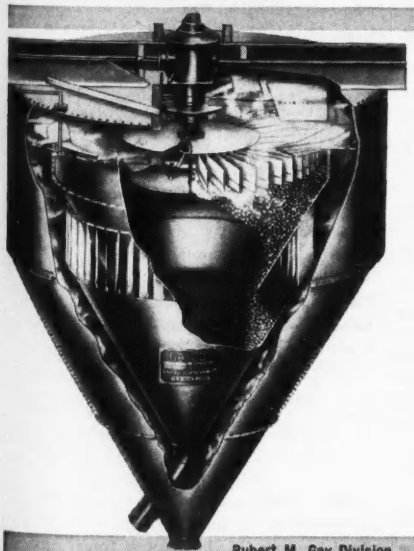
Choose yours in sizes of 10, 20, 35, 50, 90, 150, 200, 300, 450, 750 and 1050 G.P.M. Suitable for pressures to 200 psi on lubricating liquids, or 100 psi on non-lubricating liquids. Built of many types of metals and combinations of metals. Available in any type of mounting and power desired.



For complete information, write for catalog CCC.

VIKING PUMP COMPANY
Cedar Falls, Iowa, U.S.A. In Canada, it's "ROTO-KING" pumps
See Our Unit in Chemical Engineering Catalog
Check 4355 opposite last page

USING SCREEN SEPARATIONS? NOTHING CLASSIFIES AS PERFECTLY AS AIR



GAYCO
CENTRIFUGAL AIR SEPARATORS

Classify practically all dry fine materials

You get:
- CLOSER SEPARATIONS
- IMPROVED PRODUCTION
- NO UNDESIRABLE OVERSIZE.

RANGE 60 to 400 mesh.
Timken bearings.
Choice of Standard or Heavy Duty Models.

this helpful booklet sent on request

Robert M. Gay Division
UNIVERSAL ROAD MACHINERY CO.
117 Liberty St., New York 6, N. Y.
Factory and Laboratory: Kingston, N. Y.
In Canada: Watson-Jack Hopkins Ltd., Montreal

Check 4356 opposite last page

NEW LITERATURE

Describes fork truck

Illustrated, four-page bulletin describes manufacturer's 2000-lb capacity, electric-powered fork truck. Included are detailed specifications of truck designed for applications where quick handling and tiering in confined areas is important. Model F-26T2 bul — Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

Check 4357 opposite last page.

Inert gas system

Inert gas generating equipment is described and illustrated in four-page bulletin, which includes flow chart and cost analyses of typical inert gas system. Applications are cited. Bul I-457 — Gas Atmospheres, Inc., 20011 West Lake Road, Cleveland, Ohio.

Check 4358 opposite last page.

Copper foil applications

Manufacturer's eight-page booklet suggests and illustrates commercial applications of copper foil. Properties of foil are described. Publication D-8-R — Copper Foil Department, The American Brass Company, Waterbury, Conn.

Check 4359 opposite last page.

Resin file folder

File folder on epoxy casting resins contains over 20 technical data sheets, literature references, and price list. Resin in file folder — Emerson & Cuming, Inc., 869 Washington St., Canton, Mass.

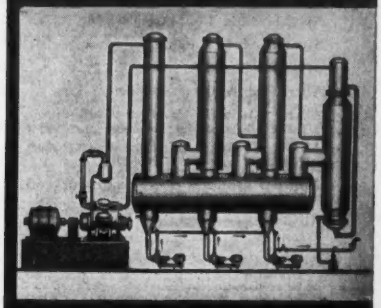
Check 4360 opposite last page.

Polyethylene lab ware

Manufacturer's catalog of 16 pages illustrates and describes line of polyethylene laboratory ware. Cat 57P — Schaar & Company, 7300 West Montrose Ave., Chicago 34, Ill.

Check 4361 opposite last page.

Mojonnier
LO-TEMP EVAPORATORS



for
- concentrating heat sensitive chemical solutions
- recovering solvents

- No steam required.
- Uses negligible amount of condensing water.
- Low operating temperatures.
- Less operating attention.

adds up to *lowest concentrating cost!*

Pictured Above —
MOJONNIER TRIPLE-EFFECT LO-TEMP EVAPORATOR as installed in large chemical plant, evaporating 5,000 lbs. of water per hour from a chemical solution at a maximum temperature of approximately 40° C. The unit uses a 75 h.p. ammonia compressor.

Full details on the Lo-Temp Process will be sent you promptly.
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4601 W. OHIO ST., CHICAGO 44, ILL.

QUALITY Mojonnier YOU CAN TRUST
LO-TEMP EVAPORATORS
Sales Offices in Principal Cities

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More "That's Interesting" articles are on pages 2, 3, 5, 63, 213.

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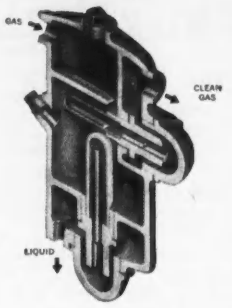

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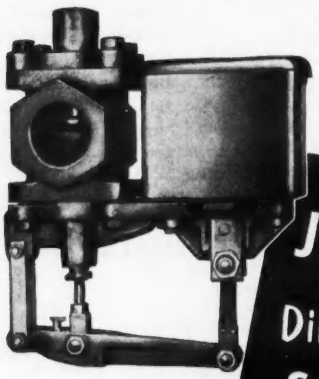

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☐ 4190	☐ 4224	☐ 4258	☐ 4292	☐ 4326	☐ 4360
☐ 4191	☐ 4225	☐ 4259	☐ 4293	☐ 4327	☐ 4361
☐ 4192	☐ 4226	☐ 4260	☐ 4294	☐ 4328	☐ 4362
☐ 4193	☐ 4227	☐ 4261	☐ 4295	☐ 4329	☐ 4363
☐ 4194	☐ 4228	☐ 4262	☐ 4296	☐ 4330	☐ 4364*
☐ 4195	☐ 4229	☐ 4263	☐ 4297*	☐ 4331	☐ 4365
☐ 4196	☐ 4230	☐ 4264	☐ 4298	☐ 4332	☐ 4366
☐ 4197	☐ 4231	☐ 4265	☐ 4299	☐ 4333	☐ 4367
☐ 4198	☐ 4232	☐ 4266	☐ 4300	☐ 4334	☐ 4368
☐ 4199	☐ 4233	☐ 4267	☐ 4301	☐ 4335	
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THAT'S INTERESTING

Students at work

National Bureau of Standards has a program which gives students an opportunity to apply their education in jobs.

Actual work in labs has been found to be an incentive for a continuing interest in scientific studies and also a help in formulating career objectives. Some of these younger employees have made direct contributions to the research program. Students are able to maintain the affiliation with the NBS.

Ion Drive

Ion propulsion is coming closer to reality. At the Giannini Research Laboratory, the first known quantitative measurements were made of propulsion by ionized gases. It has been stated that impulses as high as 600 sec were obtained by using helium gas as working fluid. This is twice the value obtained by most advanced of chemical rockets.

For more information on product at right, specify 4367 see information request blank opposite last page.

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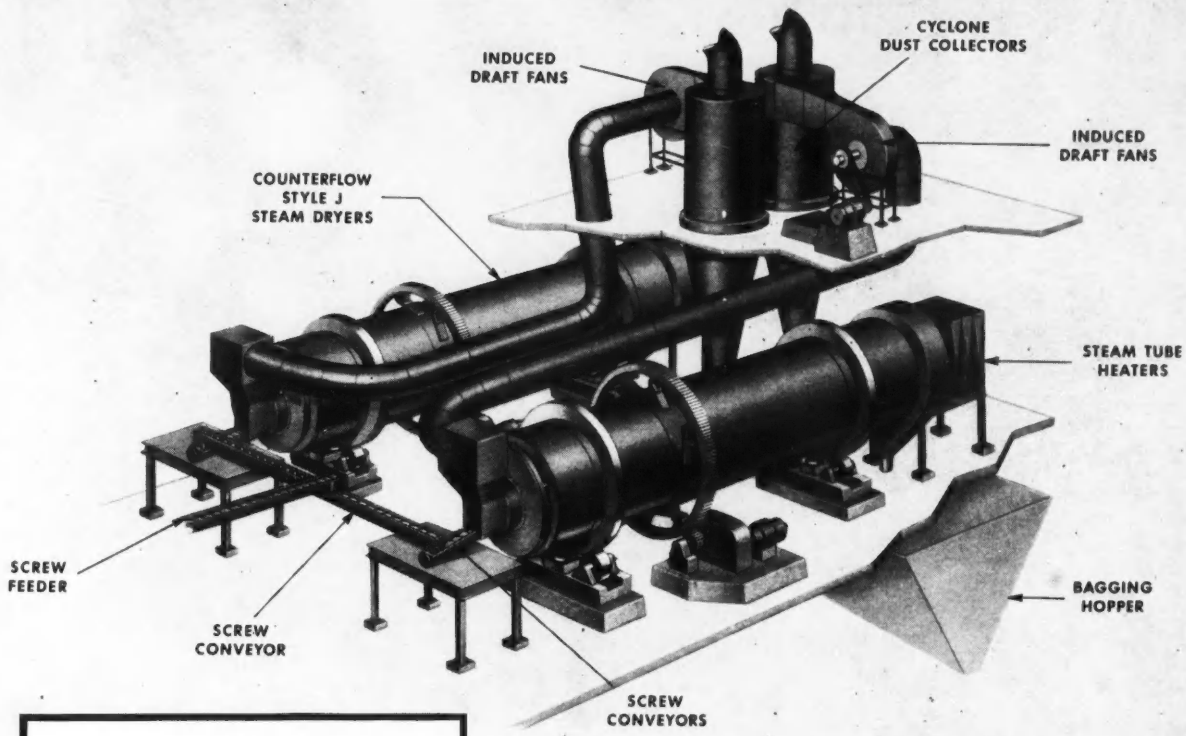

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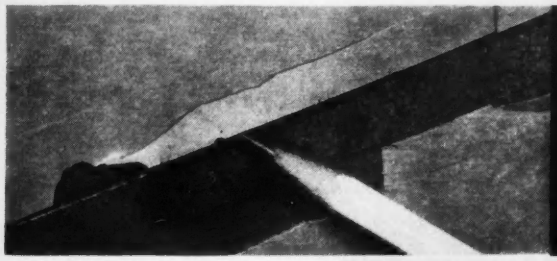
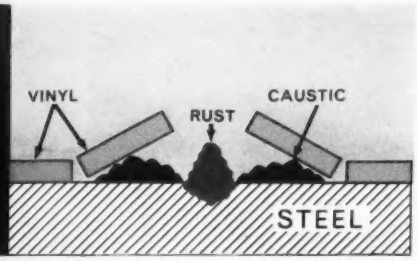
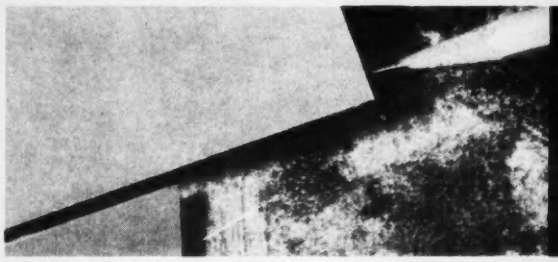
PUZZLED ABOUT PRIMERS?

Here are tests you can duplicate

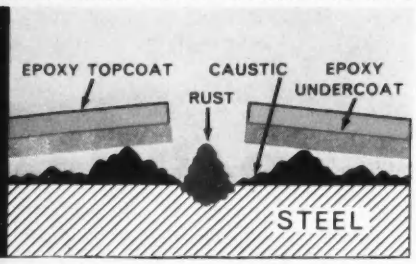


TEST 1—One coat of self-priming vinyl. Coating breaks away (L) due to severe undercutting (R), exposing metal to progressive corrosion.

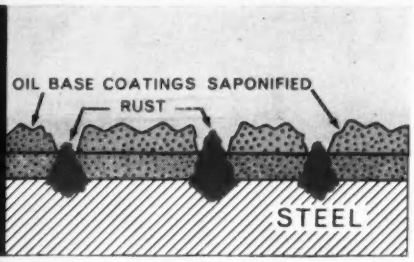


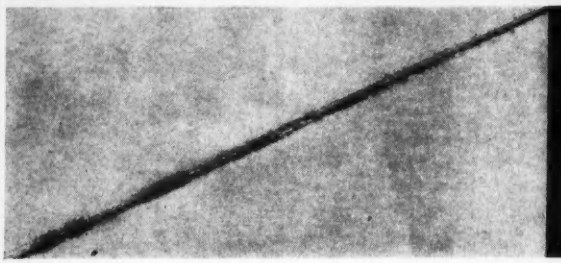


TEST 2—Epoxy primer, epoxy topcoat. Coating lifts off in single sheet (L) as adhesion fails (R), exposing entire surface to corrosion.

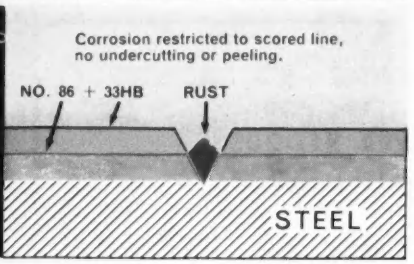


TEST 3—Oil primer, oil topcoat. Both coats fail completely (L) as underfilm caustic reacts on their oils to form soaps (R).





TEST 4—Amercoat's No. 86 inhibitive primer and No. 33HB vinyl topcoat. Corrosion restricted to scored line (L), no undercutting or peeling (R).



The purpose of these accelerated tests is to show what happens when various types of coatings are exposed to a typical corrosive environment. Four clean steel panels, free from mill scale and rust, were coated with different combinations of primers and topcoats. Each was scribed to bare metal and immersed in salt water in the presence of free oxygen, for two weeks.

As caustic deposits formed over cathodic areas of the steel in tests 1, 2 and 3, failure occurred in three ways. The vinyl, though not directly attacked, was undercut as caustic spread beneath the film and destroyed adhesion. The epoxy coating, known for critical adhesion to smooth metal, proved impervious to caustic attack. It was, however, lifted in its entirety as moisture spread beneath the surface. The entire oil paint film was quickly penetrated by the salt solution, creating widespread corrosion and caustic formation. The caustic then reacted with the oil to saponify the film.

In the fourth test the corrosion was limited to the score mark. Reason: Amercoat No. 86 Primer resists undercutting and adheres tenaciously, inhibiting electrolytic corrosive action.

The conclusions are clear. To provide long term protection in corrosive service, start with Amercoat No. 86 Primer, which provides a sound and lasting base for quality topcoats such as Amercoat No. 33HB.

Write today for complete data on Amercoat No. 86, and have the details on hand when planning your next important coating job.

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